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and Maintenance of Way

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Tamping the Roadbed

PROPER tamping of roadbed is necessary to maintain a level track, so it is important to know where the tamping should be done. The general principles are understood, but it sometimes is the case that the laborers will tamp the section of roadbed beneath the center of the tie, which is not only unnecessary, but actually detrimental.

The load on the ties should be resisted by the ballast under the rails. In order to obtain this condition, tamping should be done an equal distance on each side of the rail, leaving the ballast below the center of the tie untouched. There is sometimes a tendency, especially on curves, for the load to be distributed on the ballast to one side of the center of the bed in cases where the central section of bed is tamped. This distribution of load will effect ultimately a sinking of one rail, causing an uneven roadbed.

While the theory of tamping is simple, the foreman finds it difficult to make the laborer do a good job, because the laborer does not appreciate the value of a point as the above and believes that he would do a better job by tamping the entire length of the tie.

Tie Plates

THE subject of tie plates has always been of much interest to railway engineers. While there has not been any doubt as to the qualities desired for a satisfactory plate, there has been much difference of opinion as to the design of plate which gives the required results.

Among the functions of tie plates, there are included the preservation of the ties and the maintaining of track at gauge. Should we consider present practice of the many roads, we would be in a quandary as to the method of securing these results. Investigation along this line must cover a comparison of several designs of plates used under the same conditions on curves and tangents. By the same conditions is meant the same weight of rolling stock and the same kind of timber. Thus, it is seen that there is a wide field for experimenting. There is no other way, however, of ascertaining what should be termed best practice. Comparisons are not afforded by the results attained on many roads where prevailing conditions are at variance.

To hold the gauge of the track, a tie plate must grip the tie firmly. If it does not do this, the spikes will work loose and allow the plates to shift to a certain extent. Often a loose plate will be accompanied by a rattling noise which is of secondary importance as far as maintenance is concerned, yet which is of extreme annoyance and must be prevented. Loose plates also abet the cutting of ties, though not as much, of course, as rails would because of the greater bearing surface of the plate.

The cutting of the tie by plates with deep flanges is

an undesirable feature, because a tie plate should in no way be an agent of deterioration. If the tie is cut by the plate so that the tie plates cannot be reset efficiently in case the tie must be removed for roadbed repairs, the preservation of the tie is not advanced by the use of the plate.

The depth of flange is a vital point. It must be sufficient to allow of gripping the tie firmly and yet must not be too great to aid in the destruction of the tie. The midway point is to be attained in order to obtain for the plate a high efficiency.

While these points are considered, one must not forget that a tie plate should be of such design that it can be set readily and firmly. This latter feature is seen to be of importance when the difficulty of satisfactorily setting plates is called to mind. It is known that a plate, which is not set firmly, will soon work loose under traffic, becoming of no practical value.

An ideal tie plate is one which combines with the qualities mentioned, that of durability. A plate must be of such material that it will resist the bending stress caused by the pressure of the rail, having a thickness in proportion to the weight of rolling stock on the road. As it becomes necessary to increase the weight of rail so it is with the weight of the tie plate.

The present tendency in the design of tie plates is to reduce the depth of flange to such extent that it still retains the quality of gripping the rail firmly. It would be well to experiment on roads of different weights of rolling stock with tie plates of the many designs now in use set on tie timber of several degrees of hardness. With this data in tabulated form, the efficiency of the tie plates now in constant use could be definitely ascertained.

Mechanical Construction of Apparatus

THE variation in mechanical details of construction of certain apparatus, used in railway work, should be considered carefully on account of its influence on the date of delivery and cost. The variation might be only in the style of frame, yet, while this difference does not interfere with the construction of some parts of the apparatus, it requires that the manufacturer shall keep in stock two or more styles.

In many cases no better results are obtained from the standpoint of operation by one style over another. As far as appearances and ease of handling are concerned, it is a matter of opinion among the engineers as to which style is best. These opinions might be freely discussed by men, competent to judge, at the engineering conventions, which have for one object the consideration of just such points.

The advantages in having standard forms for all roads will be appreciated if the matter is considered on the basis of delivery and economy. The apparatus can be delivered more readily and can be manufactured at a lower cost, if a certain style is handled exclusively.

The manufacturer must keep in stock a certain number of each style in order to ship immediately upon order. This means that he should hold in stock a large amount of apparatus and necessitates a layout of capital which is practically dead. On this account he must sell his apparatus at a higher figure to cover the interest on the capital invested in stock.

Another side of this question, which will also appeal to the engineer, is that he does not always get immediate shipment. There are times when the manufacturers do not have their special design of apparatus in stock, because their stock of that style of apparatus was recently depleted.

A case, which might be cited in the way of an example, is the mechanical construction of track relays. The various shapes of relay frames require the manufacturer to keep several styles in stock. Now, the cost of these devices might be considerably reduced and also promises of earlier shipment might be had, if a uniform style were adopted.

In conclusion, it might be said that there are advantages to be derived from uniformity in style by both the engineer and the manufacturer. One could assist the other in securing the most profitable arrangement. If this were done, the engineer would not have to be concerned about shipment and the manufacturer would not be burdened with an excess of idle stock.

Fire Protection of Frame Trestles

MANY opinions are advanced as to adequate methods of safeguarding frame trestles against fire. The question of protection was discussed at length in a recent convention of Railway Superintendents of Bridges and Buildings. These men are best qualified to judge of a method which combines efficiency and economy.

The use of the water barrel is advocated by some engineers as a safeguard. The maintenance of way men keep the barrels in condition and ready for service. It is a method which is pursued more extensively than one might surmise. It is, however, only a safeguard to total destruction and is not a protection against fire. If the fire is noticed by someone before it gains headway, it may be easily extinguished in this way. The water barrel has often served its purpose, yet, as it does not prevent the timbers from catching fire, it should not be classed as a means of removing the fire risk.

The use of a galvanized iron covering on stringers and caps on piles is the practice of many roads. This method provides efficient protection as has been evinced by the life of trestles thus protected. Evidence of the efficiency of this method appears in connection with several instances where the use of galvanized iron was resorted to after the occurrence of frequent fires, with the result that trouble from fire was completely removed. The only objection that might be raised to the use of galvanized iron is that the extent of the fire hazard does

not warrant the expenditure of money. In some localities and along some sections of the roads, this objection might be valid, but these places, where the risk is small, are usually located in outlying districts which are not under observation in time of danger.

Where water barrels are in use, it has been found that careful and regular inspection of trestles and removal of bad timbers has cut down the fire risk to a great extent. This is testified to by many engineers who have the work in charge.

In conclusion it might be said that efficient fire protection is obtained only by such methods which prevent incineration. Whether or not such a method will prove an economical proceeding depends entirely upon the extent of the risk, which is a variable quantity along the road.

The French Broad River Viadnct

Southern Railway

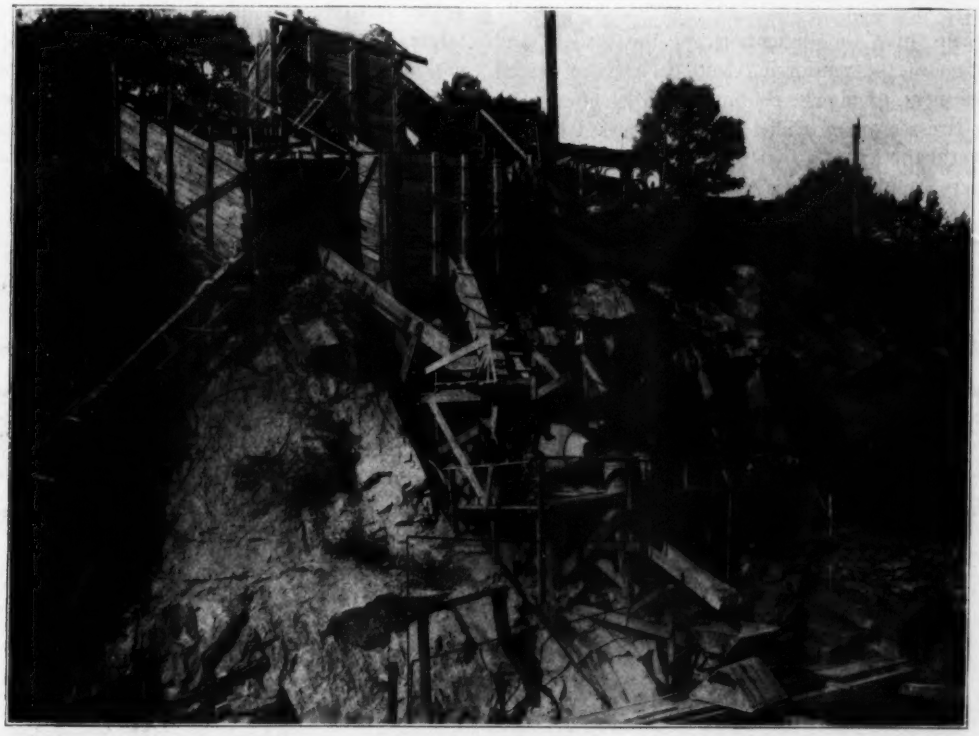
THE French Broad River viaduct, under construction by the Southern Railway, is of reinforced concrete construction. The viaduct is about 800 ft. in length, including abutment walls, and is made up of twenty-two 30-ft. skew spans. The height from lower surface of girder to top of footing is 21 ft. The footing is two or more feet deep. For each span there are three longitudinal girders and one transverse beam, which is used only as a stiffener. The slab is carried from the main girders.

The bridge was designed under Coopers' E-50 loading, 100 per cent. impact. The stress allowed in the steel was 12,500 lbs. per sq. in., and that in the concrete 600 lbs. per sq. in. A factor of safety of 4 was used in the calculations, which demanded steel of 60,000 lbs. ultimate strength and concrete of 2,400 lbs. ultimate strength. The steel was figured to carry all tensile stresses. The concrete mixture for piers was 1-2½-5 and for top work was 1-2-4. The percentage of steel reinforcement was 0.08 per cent.

The girders were designed as simple beams, the continuous effect being neglected. This gave an additional safety factor. The formula for design of girders was

$$M=\frac{wl^2}{8}.$$

The reinforcement consists of Johnsons' new style corrugated bars. The middle girder is reinforced with twelve 1¼-in. trussed bars, thirteen 1¼-in. straight bars, four ¾-in. and two ⅞-in. special bars, with 1-3-in. corrugated bar stirrups placed as shown in drawings. The reinforcement of side girders consists of seven 1¼-in. trussed bars, eight 1¼-in. straight bars, four ¾-in. straight rods and two ⅞-in. special bars, with 1-3-in.



PLANT AT WEST END OF BRIDGE, SHOWING FROM TOP TO BOTTOM OF SLOPE IN THE FOLLOWING ORDER—CRUSHER, STONE AND SCREENING BIN, CHARGING PLATFORM AND HOPPER, MIXER, CHUTE AND CONCRETE CAR, CEMENT HOUSE TO RIGHT AND RUNWAY FOR SAND AND CEMENT BETWEEN CEMENT HOUSE AND ROCK BLUFF—FRENCH BROAD RIVER VIADUCT.

VIEW SHOWING COFFERDAMS IN PLACE, FRENCH BROAD RIVER VIADUCT.

corrugated bar stirrups placed as shown in the sectional plans. The transverse beams are reinforced with six ⅝-in. corrugated bars.

The floor slabs are reinforced longitudinally with sixteen ¾-in. bars and transversely with ⅞-in. bars placed 3 ins. on centers. There are four styles of floor slab bars. The design formula for floor slabs was

$$M = \frac{wl^2}{10}.$$

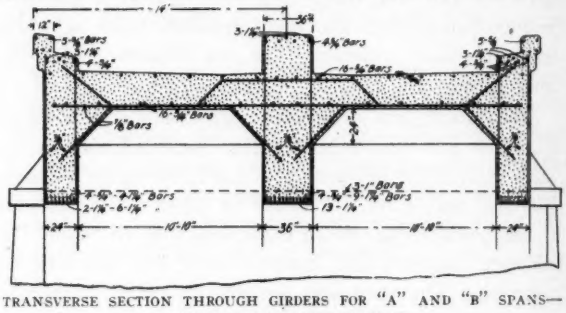
The horizontal reinforcement of the smaller piers consists of eight 1-in. rods and of the larger of eleven 1-in. rods. The vertical reinforcement of the pier consists of twelve 1-in. bars and the foundation reinforcement of twelve 1¼-in. bars. The coping is reinforced with five ⅝-in. bars.

The plans give the dimensions of the girders and the location of the reinforcing bars. The bars extend across the piers, giving the continuous girder effect. The shearing stresses are provided for with trussed bars as well as vertical stirrups.

The piers are of two types, A and B. They are placed from east to west in the following order: East abutment, two of type A, one of type B, three of A, one of B, three of A, one of B, three of A, one of B, three of A, one of B, two of A and then the west abutment. The girders adjoining the abutments are of type C, those on each side of piers B are of the B type and all others are of the A type.

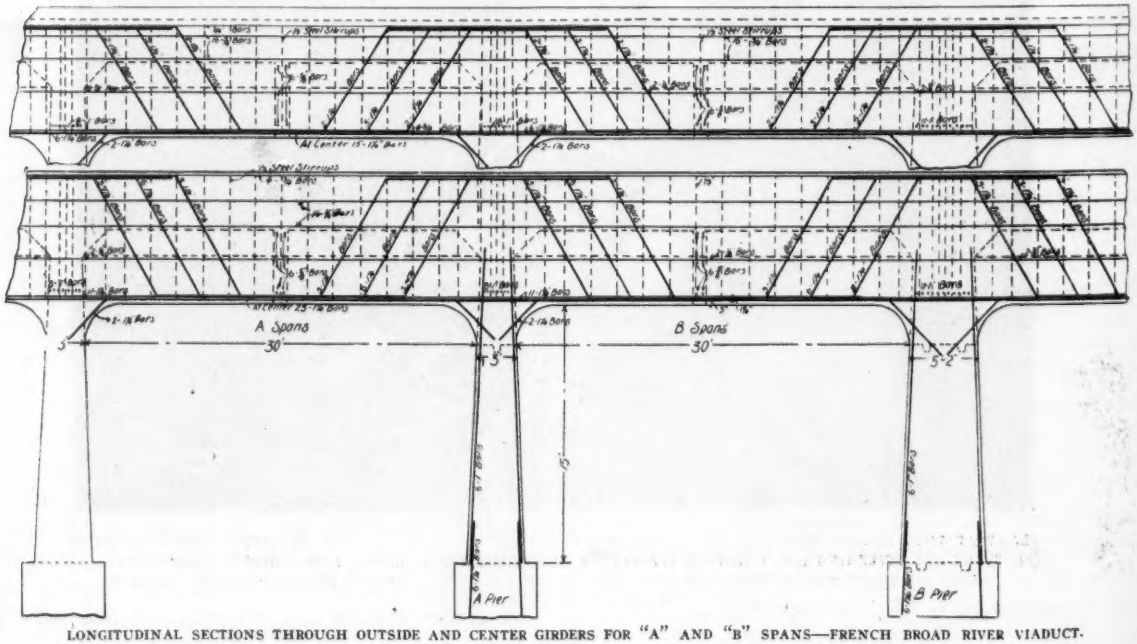
Piers A have foundations, 5 ft. 9 ins by 40 ft. 1 in., and are 3 ft. 9 ins. by 38 ft. 1 in. at the base. The batter is 8 ins. in 12 ft. Piers B have foundations, 7 ft. 8 ins. by 42 ft. 10 ins., and are 5 ft. 8 in. by 40 ft. 10 ins. at base of pier. The batter is 8 ins. in 15 ft.

The views give a clear idea of the method of placing the concrete. It will be noted that for the piers on the west side of the river the stone came direct from the quarry without extra handling to the crusher, from the crusher into mixer and then into the forms. It proved a very economical method of placing concrete.

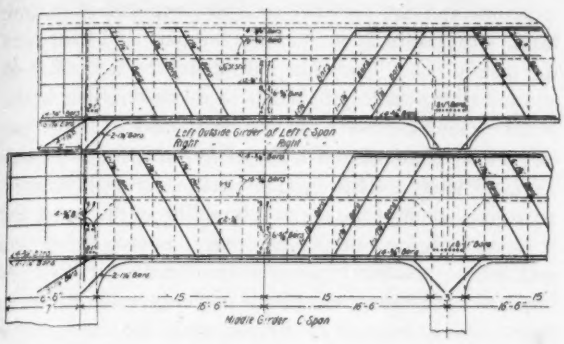


TRANSVERSE SECTION THROUGH GIRDERS FOR "A" AND "B" SPANS—FRENCH BROAD RIVER VIADUCT.

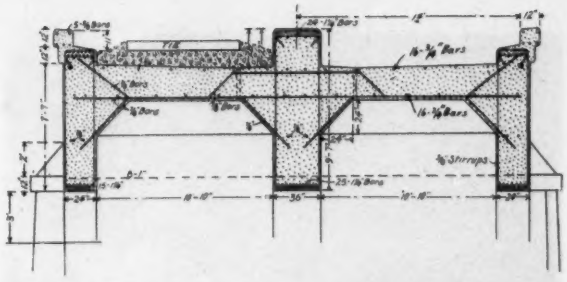
The concrete was mixed with two Smith mechanical mixers and placed by means of cars and chutes. The cost of labor per day was $1.25 to $1.50 and for carpenters $1.75 to $2.50. The cost of steel per 100 lbs. was $2.53 f. o. b. Asheville, N. C. The approximate number of cu. yds. of concrete was 8,000 and approximate weight of steel was 460,000 lbs.



LONGITUDINAL SECTIONS THROUGH OUTSIDE AND CENTER GIRDERS FOR "A" AND "B" SPANS—FRENCH BROAD RIVER VIADUCT.



LONGITUDINAL SECTIONS THROUGH OUTSIDE AND MIDDLE GIRDERS FOR "C" SPAN—FRENCH BROAD RIVER VIADUCT.



TRANSVERSE SECTION FOR "C" SPAN—FRENCH BROAD RIVER VIADUCT.

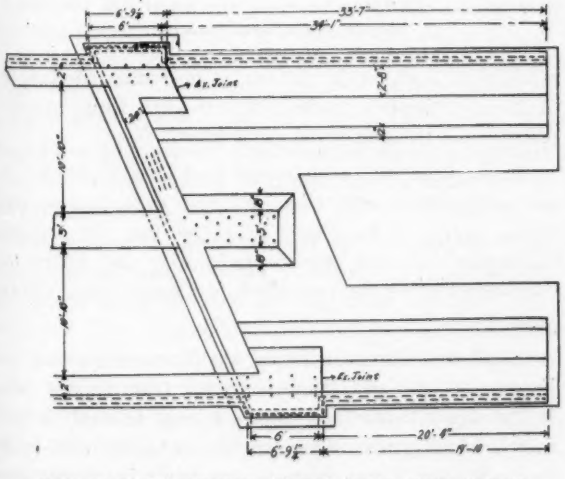
Use of Beech for Railroad Ties

EXPERTS in wood preservation in this and other countries have discovered that the beech makes a most lasting and durable cross-tie when properly treated. In the search for railroad tie timber to fill the wide gaps made by the dwindling supply of white oak, lumber manufacturers have been compelled to turn to many woods which were once considered inferior, but which under creosote or other chemical treatment have been found to furnish excellent substitutes for the oak.

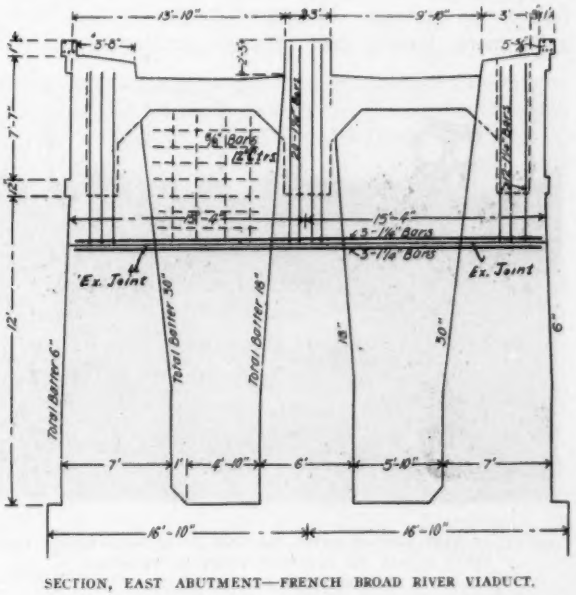
Railroad builders have rejected beech heretofore because it decays quickly in damp places. They wanted oak, and when that could not be had they took other decay-resisting woods, but in most cases they did not consider beech at any price, except as a temporary makeshift. Yet it has been proved by actual tests of long duration that a beech tie may be given a preservative treatment which will make it outlast white oak. It is possible to turn this knowledge to great practical use in relieving the enormous demand upon the limited supply of good tie timber.

The beech is found widely distributed throughout the eastern portion of the United States, reaching its best development in the basin of the lower Ohio river, and on the slopes of the Allegheny mountains. It grows to an average height of 70 to 80 feet, but occasionally trees of 120 feet in height are found. The diameter of mature trees is often three or four feet. In the forest the beech forms a comparatively slender stem clear of branches for more than half its length. The wood is hard, strong, tough, and very close grained. Its use is largely limited to the manufacture of chairs, shoe-lasts, plane-stocks, handles, and for fuel.

The ideal timber used for cross-ties is white oak. This combines all of the good qualities of the beech and in addition is very durable. Consequently it has been widely employed by the railroads for tie purposes. It not only is an excellent wood for ties, but is widely used in ship-building, for construction, and in cooperage, the manufacture of carriages, agricultural implements, the interior finish of houses, and for furniture. On account of its extensive use the supply has been greatly reduced, and a great many railroads are now forced to pay almost prohibitive prices for white oak ties or to substitute other and cheaper woods to replace the white oak ties rapidly disappearing from their lines. Michigan cedar or arborvitae has been extensively used to take the place of white oak. This is very durable, but under heavy traffic is severely cut by the rails which necessi-



PLAN OF EAST ABUTMENT—FRENCH BROAD RIVER VIADUCT.



SECTION, EAST ABUTMENT—FRENCH BROAD RIVER VIADUCT.

SHOWING METHOD OF RUNNING UP PIERS IN 6-FT. SECTIONS—PIER IN FOREGROUND, NEAT WORK 2-3 DONE; NEXT PIER COMPLETED, FORMS STILL IN PLACE; NEXT PIER TWO-THIRDS STRIPPED; FORMS IN PANELS 6 FT. BY 11 FT. 3 INS.; SUFFICIENT PANELS WERE BUILT FOR TWO COMPLETE PIERS WITH CORRESPONDING NUMBER OF END SECTIONS, AND ALSO ELEVATED TRAMWAY ON WHICH CARS CONVEYED CONCRETE FROM MIXER TO FORMS AND WHICH SUPPORTED HOPPER AND CHUTES AT EACH PIER—FRENCH BROAD RIVER VIADUCT.

tates the use of tie plates and other protective devices. The available supply of cedar is now running short and it is necessary to seek further for new tie timbers.

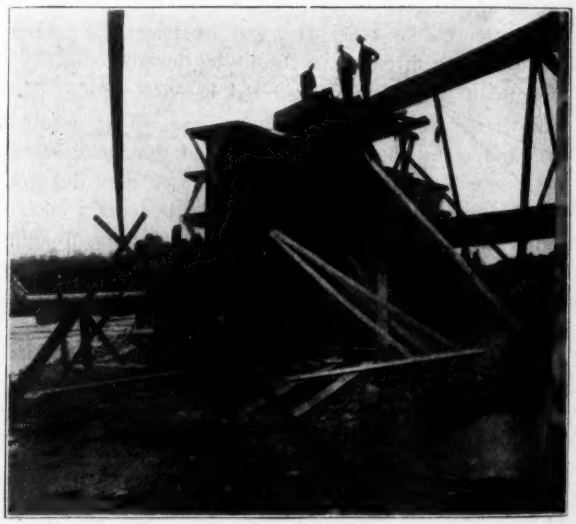
Beech suggests itself. It has all the good tie's qualities except durability. When laid in the track decay quickly destroys beech timber unless rendered immune by preservative treatment. It receives such treatment readily—much more readily than oak which needs it less.

There is a reason why beech is more susceptible to treatment than white oak. Very early in the life of a white oak tree it begins to form heartwood. As a result, when the tree is large enough for ties it contains sapwood only through the width of a few outer annular rings. Sapwood lends itself readily to impregnation with preservative substances, but the heartwood of white oak is very resistant. Heartwood in most cases is naturally more durable than sapwood on account of its structure and the preservative substances which it contains, such as resin in the case of pine and tannin in the case of oak. The white oak, therefore, is durable on account of its large proportion of decay-resisting heartwood. On the other hand the heartwood of white oak can not be impregnated with preservatives, except with great difficulty. This fact of itself is of little importance on account of the natural durability of the wood, but it tends to bring out the difference between white oak and beech. In the latter tree the heartwood does not begin to form before the tree is moderately old and even then without regularity. Consequently the beech tie is composed largely of sapwood and this partly accounts for its lack of durability. However, because of its porosity beech easily allows itself to be impregntaed with preservative substances, thus rendering it possible to guard effectively against decay.

Many preservatives have been employed for protecting beech ties abroad, particularly in France and Germany. After numerous trials the most efficient preservative under all conditions of exposure has proven to be creosote or dead oil of coal tar. Concerning the length of life of a properly treated beech tie, Mr. Rutgers, proprietor of a treating plant in Germany, says:

"In the year 1897 I undertook to deliver 50,000 beech ties impregnated with oil of tar and warranted to last fifteen years. I have only to regret that the railway exchequer does not practice reciprocity and offers no compensation for the ties which last longer than fifteen years."

Of all the European roads, the Eastern Railway of France has obtained the best results from treated ties. It uses beech timber and injects a large amount of creosote of high grade. Oak ties had to be removed from its track after fifteen years of use while beech ties im-



VIEW SHOWING SHEETING IN PLACE AND FORMS FOR CONCRETE—FRENCH BROAD RIVER VIADUCT.

PLANT AT EAST SIDE OF RIVER—DELIVERY BY WHEELBARROWS, CONCRETE RAISED BY INCLINED HOIST TO TRAMWAY—FRENCH BROAD RIVER VIADUCT.

pregnated with creosote lasted thirty years. Many other instances of long service from creosoted beech ties might be given.

The Forest Service of the U. S. Department of Agriculture has spent considerable time in developing a cheap, yet efficient method of treating certain classes of timber in order to preserve them against decay, and information on the investigations may be obtained by writing to the Forester, Washington, D. C. This is known as the "Open Tank" method and is probably well adapted to the treatment of beech ties and similar timbers which contain a large amount of sapwood. The treatment consists in immersing the timbers in alternate baths of hot and cold creosote, or other preservative. The ties are placed in a tank of hot creosote for a few hours, the length of time depending upon the amount of moisture contained in the timber. They are then placed in a bath of cold preservative for a short period which completes the treatment. When the wood is heated in the first bath the air and moisture in the wood cells and intercellular spaces is expanded and some of it is driven out. Upon immersion in cold preservative the difference in temperature causes the expanded air and moisture to contract, thus forming a partial vacuum which causes the liquid to penetrate the wood to the desired depth. The ties should be air seasoned before being subjected to treatment. This can be accomplished in a short time by piling them in open piles, thus allowing the air to freely circulate around them. Beech checks very little when properly piled. In this respect it excels white oak.

The Railway Signal Association Convention

ON Tuesday morning, October 8, the eleventh annual convention of railway signal men was called to order. The gathering of engineers, interested in this branch of railroad engineering, is one of great importance to railway officials today, because the subject of signaling is practically new, signaling being in a stage of development at the present time. The standardization of signaling methods and apparatus is only being accomplished gradually.

As each report was presented to the convention, the members of the association thoroughly discussed its various phases. The attitude of the convention favored a complete investigation of each report. There was no tendency to simply cover ground and do the work of the association in a haphazard fashion. On this account several valuable reports were not completed and had to be referred back to the committees for consideration at the next meeting of the association.

The convention lasted three days, October 8, 9 and 10. On the morning of the first day, the opening addresses and preliminary business was completed. After the address of welcome in behalf of the city by Hon. S. H. Becker, Mayor of Milwaukee, President Peabody addressed the members of the association. In his talk, he reviewed the work of the past year and discussed the growth of the association. He urged the adoption of standards for signal equipment, and the reorganization of committees in order to distribute the work more evenly.

The business of the association was opened with a consideration of changes in the constitution. The changes advocated were unanimously approved by the association. The amendments affected the qualifications for members, particularly representative members, who are appointed by the railways. Other amendments covered the election of officers, appointment of special committees and recommendations of the association.

ELECTRIC INTERLOCKING.

Following upon this, the report of committee No. 8, on standard specification for electric interlocking, was begun. The members, comprising committee No. 8, were as follows: L. R. Clausen, C. M. & St. P., Chairman; E. A. Everet, Mich. Cent.; M. H. Hovey, Ill. Cent.; F. P. Patenall, B. & O.; A. Kelley, C. C. C. & St. L.; G. S. Pflasterer, N. C. & St. L.; G. H. Dryden, B. & O.; E. B. Pry, Penna. Lines West, and J. J. Cozzens, N. Y. C. & H. R.

The report of the latter committee occupied the remainder of the morning session and was continued in the afternoon. It was discussed by paragraphs, Mr. Clausen explaining the position taken by the committee on each section. The discussion of this report was not completed and the report was finally referred back to the committee. Amendments were made, several of which will be noted to illustrate the explicitness desired by the members. The sentence, "The contractor's usual practice shall govern, except as herein otherwise provided," was amended to read "The contractor's recognized best practice at the time the work is let shall govern, etc." It was thought that the usual practice might not be the best in view of the progress which is constantly being made. The sentence, "The contractor shall furnish for replacement, free of cost, f. o. b. Works, any apparatus or material which, when used for its intended purpose, shall prove defective within a period of one year after having been placed in service," was amended by an insertion after the words apparatus or material, of the phrase, "Of his own manufacture or furnished on his own specifications." The amendment limited the liability of the contractor to such material for which he was really responsible. Several paragraphs are to be revised. The discussion of the report ended with the section on switches. Several paragraphs in the latter section, referring to switch mechanisms, are as follows:

"Mechanism shall be equipped with an efficient friction clutch to prevent damage to same in case movement of switch is obstructed. If friction clutch fails to release motor, all parts of mechanism shall be strong enough to permit of stopping the switch at any point of its movement by introduction of an obstruction between point and stock rail, without injury to any part.

"Switch lock rod shall be locked by a plunger of minimum sectional area of two (2) square inches, arranged in such manner that switch shall be fully locked before an indication can be obtained.

"The hole or notch in lock rod shall be not more than one-sixteenth inch larger than plunger, measured in a horizontal line.

"When the lock rod is moved 3/32 inch out of the lock position, locking plunger shall engage a minimum area of one-sixteenth square inch. Ends of locking plunger must be squared."

As the report of the committee on standard specifications for electric interlocking has been referred back to the committee, it might be well to make note of the fact that excellent results were attained. The recent development of electric interlocking gave the committee a difficult task. One can easily realize the difficulties accompanying the drawing up of entirely new and distinct specifications. The results, so far attained, should be gratifying to the members of the association and railroad men in general.

The time devoted to the report of committee No. 8 precluded all possibility of discussing the report of committee No. 15. No reports were returned by committees Nos. 1 and 6 on automatic block signal systems and cost in estimates for installation respectively.

INTERLOCKING AND BLOCK SIGNALS.

The second day was occupied entirely by the report of the special committee on interlocking and block signals. After a thorough discussion of the report, it was decided to submit it to letter ballot of the members of the association. The report, together with discussion of same, will allow of more careful investigation by all members. If the report is adopted, it will be submitted to the American Railway Association for their approval. The latter association desires the co-operation of the Railway Signal Association in this matter. The members of this special committee are as follows: A. H. Rudd, chairman; L. R. Clausen, vice-chairman; Azel Ames, Jr.; C. C. Anthony; H. S. Balliet; Chas. A Dunham; C. E. Ellis; M. H. Hovey; J. C. Mock; F. P. Patenall; J. A. Peabody; Frank Rhea; Thos. S. Stevens, and H. H. Temple.

The report of the committee covered the requisite indications for a complete system of signaling. The aspects for these indications will be treated in a later report of the committee The indications are to cover all conditions, giving a complete system. It is not meant that these indications are requisite for all systems, because the conditons on some lines might not require the full number of indications. A uniform method of signaling is desired, which shall be uniform as far as the requirements of the specific lines are similar, using the same indications for the same purposes.

The system of fixed signal indications is based upon the assumption, "that signals should indicate to the engineman what is required of him in the control of his train and also the reason for the required action." The following paragraph was adopted by the convention as the basis of the system:

"It is, therefore, the conclusion of the committee that in a system of signal indications, the aspects should primarily serve to indicate what is required of the engineman in the control of his train, and secondarily, should provide for the giving of certain additional useful information, limited by the reasonable practicability of displaying the necessary aspects and the added burden upon the engineman's memory that will result from the use of many aspects."

The method of reasoning to arrive at the basis of the system was explained by Mr. Clausen, who then proceeded to outline a method of determining the requisite indications. Mr. Rhea stated in his discussion of the subject that the committee recognized the necessity of expediting as well as safeguarding traffic in determining the requisite indications.

The outline of indications for a method of uniform signaling was given as follows:

REQUISITE INDICATIONS.

STOP—1. Stop here until authorized to proceed. (Interlocking, and manual block signals.)

2. Stop here and then proceed. (Automatic block signals.)

3. Stop here and investigate. (Stop signs and home switch signals.)

PROCEED—CLEAR—4. Proceed on unlimited speed route; next signal at proceed. (Interlocking signals.)

5. Proceed on limited speed route; next signal at proceed. (Interlocking signals.)

6. Proceed. (Interlocking, manual block and automatic block signals.)

7. Continue. (Switch signals and track tank signs.)

8. Restriction removed. (Signs, removing slow sign restriction.)

PROCEED—CAUTION APPROACHING—9. Proceed prepared to stop at indicated point ahead. (Distant signals for Nos. 1, 2 and 3.)

10. Proceed on unlimited speed route next signal is at stop. (Interlocking signals.)

11. Proceed on limited speed route next signal is at stop. (Interlocking signals.)

12. Proceed prepared to pass next signal at limited speed. (Distant signals for No. 5.)

PROCEED—CAUTION HERE—13. Reduce speed. (Slow signs.)

14. Proceed on low speed route next signal at proceed. (Interlocking signals.)

15. Proceed at low speed. (Interlocking signals.)

SUPPLEMENTARY INDICATIONS.

"A" Take siding here. (Manual block signals.)

"B" Take siding at next station. (Manual block signals.)

"C" Proceed block is occupied. (Manual block signals.)

Note.—Manual block includes telegraph block, staff block, and controlled manual block. Indication No. 7—This indication may also be given at interlocking signals which are not block signals, where permissive blocking is used, at block signals (block station closed), at train-order signals (no orders) and at flag station signals (no passengers). Indication No. 13—This indication may also be given at a signal to show that "19" orders are to be received.

From the above outline of requisite indications, the committee deduced the requisites of installation. The wording of several requisites departs from that of the Standard Code and there are also several new requisites which do not appear in the Standard Code.

On the third day, October 10, there remained a number of reports to be considered. On motion, the report of committee No. 5, on specifications for automatic semaphore block signals operated by direct current for steam railroads, was accepted as a progress report. The report of committee No. 14, on remedies for the effects of foreign current on automatic block signals, was accepted and committee discharged.

The report of committee No. 11, on signal lamps, design of, etc., was accepted as a progress report. The question of lamp design is one which will warrant future consideration on account of the changes advocated from time to time.

MAINTENANCE OF AUTOMATIC BLOCK SIGNALS.

The next report was that of committee No. 2, on maintenance of automatic block signals. The report was read by President Peabody, after which it was moved to accept same with an acknowledgment of the convention's appreciation of the committee's efforts. Several paragraphs of the report, dealing with details of maintenance work, are as follows:

"Taking up the details of maintenance work we would suggest the following outline of methods as covering the best practice in the work:

"Track circuit (operated by two cells gravity battery in multiple, and using some glass enclosed type relay). The battery should be set up in the following manner: Place the copper element in the bottom of the jar, and then pour in over and around it about 4 pounds of copper sulphate crystals; suspend the zinc element and then fill the jar to within ¾ in. of the top with a weak solution (about 15 degree Baume) of zinc sulphate, and about ¼ in. coal oil of an inferior grade, to prevent evaporation. The cell will be ready for immediate use. A pan bottom copper and round amalgamated zinc are most satisfactory for maintenance. About one week later the zinc should be carefully removed and cleaned and replaced without otherwise disturbing the cell. The next attention the cell will require will be a complete renewal in the manner used in first setting it up. The time at which such renewal will become necessary should be determined entirely by the condition of the battery, and should not be at the end of an arbitrarily fixed period, as it will vary at different times depending on the cross resistance of the track circuit and other local conditions. The only other attention the battery will require will be an inspection about once a week to insure that all connections are tight and that the general condition of the battery is good. Zincs weighing less than 1¾ lbs., or used with gravity cells other than for track circuits, and coppers weighing more than 2 lbs. should be scrapped. The copper element should not be cleansed of the copper accumulations on it, as this is merely a waste of time and copper. With glass jars there is a difficulty in preventing breakages by temperature changes and this has suggested the use of one glass and one earthenware jar in a battery. The earthenware jar will not break and will hold the track circuit alone should the glass jar break. The glass jar will serve as an index to the condition of the battery, but probably this indication should be checked by a Baume hydrometer test of the earthenware cell. The prevention of freezing should not be a maintenance matter at all but should be provided for in the construction work.

"Bond wires and other track connections should be closely inspected at least twice a month. At road crossings and station platforms the character of construction should be such as to make this necessary less often—probably not oftener than twice a year.

"The condition of insulated joints is apparent to the maintainer each day and no instructions should be necessary as to their up-keep. They may be maintained either by the signal maintainer or by the track forces on request of the maintainer. The signal maintainer, however, should always assume entire responsibility for their condition.

"Switch adjustment is usually a bone of contention between the signal forces and the track forces. This may be remedied in part by substantial methods of track construction. Switch boxes should be adjusted to operate when the switch has been opened ¼ in. and throughout the remainder of the stroke. They should be closely inspected at least once each week and tested first by slowly opening the switch noting at what point the box operates, then opening and slowly closing the switch to note at what point the box ceases to operate. Next by closing the switch with moderate pressure against a stop ¼ in. in thickness, placed between the point and stock rails, to test for lost motion.

"Experiments to determine the effect of Burnettized ties on track circuits are not quite complete, but it is probable that the result will be to make it necessary to reduce the length of track circuits. A form of ballast section which will leave the rails entirely clear of the ballast should be adopted within block signal limits to avoid circuit troubles during wet weather.

"The remedy for foreign current interference has al-

ready been under discussion before this association and need not be dwelt upon here.

"Modern glass enclosed relays very seldom require adjusting. They should be kept sealed by the district foreman, and when necessary to break the seal for repairs of any description, all facts in connection with the matter should be given the district foreman for transmittal to the signal supervisor. Comparatively inexperienced maintainers should not attempt to make such adjustments, but should replace the relay with a spare one provided for that purpose and notify the district foreman. Each maintainer should be provided with one spare relay of each type used on his section.

"Within the experiences of the members of this committee it has not appeared necessary to use an additional relay of high resistance at the battery end of a track circuit. Under ordinary conditions and where a substantial type of insulated joint is used, the increased cost and complication of wiring would not appear to be warranted."

Reports were not presented by the following committees: Committee No. 3, on circuits for interlocked signals; Committee No. 4, on storage battery; Committee No. 10, on office records, and Committee No. 16, on circuits for manual block signal systems. The report of Committee No. 13, on maintenance of manual controlled signals, was, on motion, accepted.

The last report for discussion was that of Committee No. 12, on rubber covered wire. It was preferred back to the committee in order that careful consideration might be given certain objections entered against the specifications by supply men. It was to be regretted that Mr. Azel Ames, Jr., could not attend the convention, because he had given this subject very close attention, being chairman of the committee. A change was made in the title of report on specifications for rubber insulated signal wire, adopted last year, by the insertion of the copper before signal wire.

The banquet, held on Wednesday evening at the Hotel Pfister, was attended by about 350 persons. Several very interesting talks were given during the course of the evening. Mr. E. W. McKenna, second vice-president C., M. & St. P. Ry., spoke of the progress made in the art of signaling, due to efforts of the signal engineer. Col. H. G. Prout, vice-president Union Switch & Signal Co., discussed the relation of the manufacturer to the consumer and suggested that manufacturers, acting in the capacity of consulting engineers, should do their best in order to retain the confidence of the signal engineers. He believes that a great portion of the various appliances might be disposed of by uniformity of style. Mr. E. Morse, president Simplex Electric Co., spoke on the relation of the people to the railroads. Mr. Charles A. Dunham, signal engineer, Great Northern Ry., in his talk on what the signal engineer is doing, mentioned the fact that the association was striving to attain uniformity in signal practice.

The executive committee designated committee subjects for 1908 as follows: No. 1, signaling practice: No. 2, mechanical interlocking; No. 3, power interlocking; No. 4, automatic block signals; No. 5, manual block signals; No. 6, train control and cab signals, and No. 7, subjects and definitions.

The convention voted Washington, D. C., as the city for the next annual meeting. The officers elected for the ensuing year are as follows: President, A. R. Rudd, Pennsylvania; vice-presidents, L. R. Clausen, C., M. & St. P., and H. S. Balliet, N. Y. C. & H. R., and secretary-treasurer, C. C. Rosenberg, Bethlehem, Pa. The executive committee is now composed of the following members: F. P. Patenall, B. & O.; C. E. Denny, L. S. & M. S.; J. C. Mock, Detroit R. T. Co.; C. H. Morrison, N. Y., N. H. & H.; J. A. Peabody, C. & N. W., and officers of the association.

The Signal Appliance Association had charge of the exhibits, which were located in the Public Service building. The firms that had exhibits are as follows:

Adams & Westlake Company, Chicago, Ill.—Line of signal, switch and semaphore lamps showing steel construction and non-sweating balanced draft new Adlake flat flame long-time burners, also a tower lamp with large metallic shade. Represented by G. L. Walters, C. B. Carson, A. S. Anderson, W. J. Piersen, H. G. Turney.

American Instrument Company, Philadelphia, Pa.—Direct-current ammeters and voltmeters for switchboards and portable use. Represented by A. B. Weeks.

American Railway Signal Company, Cleveland, O.—An automatic signal with storage battery case operating one or two blades (each in two or three positions) with one motor; one automatic double-arm mechanism, a power starting signal, motor driven; a power dwarf signal, motor driven; electric switch lock, switch indicator, switch boxes, 2, 3 and 5 point track relays, all apparatus being shown in operation. Represented by George L. Weiss.

American Vulcanized Fibre Company, Wilmington, Del.—Samples of vulcanized fiber for rail joint and steel tie insulation. Represented by John Barron.

Battery Supplies Company, Newark, N. J.—"B. S. C. O." primary batteries, Gladstone-Lalande battery. Represented by E. G. Dodge, E. E. Hudson, F. J. Lepreau.

Bossert Manufacturing Company, Utica, N. Y.—Insulated rail joints, adjustable switch point bracket, signal blade fastener. Represented by W. F. Bossert.

Bryant Zinc Company, Chicago, Ill.—Three different types of railroad crossing bells, complete new type of annunciator, channel pins, push buttons, Waterbury batteries, zinc, copper battery sheets, glass battery jars, mock insulated joints. Represented by A. F. Klink, M. R. Briney, Henry Hovey and R. I. Baird.

The Continental Signal Company, Chicago, Ill.—Four-lever mechanical interlocking machine; Continental Signal Company's standard, full-size automatic block signal mechanism, bottom case; full-size mechanism for use in top mast case; Continental Signal Company's switch box. Represented by George H. Paine, Gaylord Thomas, W. A. D. Short, H. E. Brashares.

Corning Glass Works, Corning, N. Y.—Lenses for

railway signals and signal lamps. Represented by Fred B. Cameron.

Dressel Railway Lamp Works, New York, N. Y.—Switch and semaphore lamps, new semaphore lamp to be used on the Pennsylvania Railroad and Baltimore & Ohio at the new Washington terminal. Represented by J. M. Brown, Frank W. Edmunds.

Duplex Metals Company, New York, N. Y.—Samples of Monnot, copper-clad still products, signal wire, sheets, springs, etc. Represented by A. P. Eckert.

Edison Manufacturing Company, New York, N. Y.—Primary batteries, railway signals, gas engine ignition, open semaphore signal and crossing bells. Represented by W. M. Brodie, W. C. Patrick.

Electric Storage Battery Company, Philadelphia, Pa.—Full line of signal plates and cells. Chloride and Exide type. Represented by G. H. Atkin, T. B. Entz, H. M. Beck, W. F. Bauer.

Fairbanks, Morse & Co., Chicago, Ill.—A 4-horsepower direct-connected storage battery charging outfit, a No. 2 motor car and a new style No. 0 motor car. Represented by A. A. Taylor, R. A. Paterson, J. A. Steele, W. J. Oneil, F. Von Schlegel.

Federal Railway Signal Company, New York, N. Y.—Electric interlocking machines, switch mechanism, electric high and dwarf signals, electric lock, electric switch-box, electric screw hand release, electric tower indicator. Represented by John T. Cade, Lawrence Griffith, A. Dean, H. H. Cade, Carl Henze.

Galena-Signal Oil Company, Franklin, Pa.—Samples of Perfection signal oil and railway safety oil.

General Electric Company, Schenectady, N. Y.—One 2-arm electric motor home and distant signal, topmast type, with independent mechanisms; one topmast upper quadrant two or three position signal; one 3-position topmast motor signal, Baltimore & Ohio standard; one 3-position upper quadrant signal, which is a new Baltimore & Ohio type with Patenall spectrum; mercury are rectifier for charging storage batteries; signal relays. Represented by F. B. Corey, A. W. Jones, W. V. Moak.

General Railway Signal Company, Rochester, N. Y.—Photographs illustrating the company's apparatus and various signal installations, notably those for the Philadelphia & Western, the Baltimore & Ohio, the New York Central electric zone and the Hudson river tunnels. Represented by H. M. Sperry, W. K. Howe, G. H. Macdonough, F. L. Dodgson, J. L. Langdon.

The General Storage Battery Company, New York, N. Y.—A number of Bijur "High Duty" cells of various sizes and types used in railway signal work, also some plates of the stationary and portable types. Represented by Wilbur H. Young, John L. Jones.

Gordon Battery Company, New York, N. Y.—Samples of Gordon primary batteries and battery supplies. Represented by E. M. Deems.

Gould Storage Battery Company, New York, N. Y.—Samples of 240-ampere-hour, 120-ampere-hour and 40-ampere-hour batteries, batteries of the couple types in various sizes and capacities, new type of portable railway signal battery. Represented by J. E. Widener, H. N. Powers, G. G. Milne.

Hall Signal Company, New York, N. Y.—Style E gas mechanism, style F electric mechanism, various types of relays and lightning arresters. Represented by W. J. Gillingham, Jr., A. J. Wilson.

Handlan Buck Manufacturing Company, St. Louis, Mo.—Switch and semaphore lamps, metallic flags, new electric station lamps, Handlan engine and tail lamps. Represented by A. H. Handlan, Jr., W. W. Wentz.

Hayes Track Appliance Company, Geneva, N. Y.—Hayes derail model A, size 5, with operating stand, also half-size models of A-5, C-6 and CX-6 Hayes derails. Represented by S. W. Hayes, W. Harding Davis.

McClintock Manufacturing Company, St. Paul, Minn.—Relays, lightning arresters and signal appliances. Represented by Edward McClintock.

Northwestern Manufacturing Company, Milwaukee, Wis.—Motors, generator sets, special patent motor for operating semaphores, special dwarf motor for operating dwarf signal. Represented by William Stark Smith, Fred W., Ells.

Quincy-Manchester-Sargent Company, Chicago, Ill.—Two samples of the Q & C American insulated joint taken from the track of the Chicago & Alton after having been in service 3½ years without renewal of any kind. Represented by G. C. Isbester.

Rail Joint Company, New York, N. Y.—Several different types of insulated rail joints, samples of new improved product of fiber for insulating purposes. Represented by C. L. Bonham, E. S. Schermerhorn, R. W. Smith, J. P. Wright, S. J. Collins, G. A. Hagar, V. C. Armstrong.

Railway Specialty & Supply Company, Chicago, Ill.—Arc-Damp lightning arrester, pin and block wire joints (1908), channel pins, test connectors, P. & M. rail anchors, Smith improved nuts. Represented by P. W. Moore, Fred A. Preston.

Railroad Supply Company, Chicago, Ill.—Four different styles of highway crossing signals, the R. R. S. derail, new electric switch lock, signal relays, commutators, indicators, lightning arresters, channel pins. Represented by E. W. Vogel, Charles Cogswell, Jr., S. Deutsch.

Arthur E. Stevenson, Buffalo, N. Y.—Samples of Stevenson's electric switch and signal mechanisms. Represented by Arthur E. Stevenson.

Union Switch & Signal Company, Swissvale, Pa.—Circuit controller for attaching to shaft of mechanism signals, 4-pole and 2-pole double-throw knife circuit controller, glass-inclosed porcelain base relay, with six front and two back independent contacts, same with disc indicator attached, one 2-arm mechanism for 3-position electro-pneumatic signal, short sections of inside and outside detector bars, with motion plate, adjustable resistance coils. Represented by H. G. Prout, J. S. Hobson, S. G. Johnson, W. M. Vandersluis, W. H. Caldwallader, George Blackmore, W. E. Foster, A. G. Wilson, Lee Halliday, T. H. Patenall.

Waterbury Battery Company, Waterbury, Conn.—

Samples of Schoenmehl primary batteries. Represented by C. B. Schoenmehl.

Westinghouse Machine Company, Pittsburg, Pa.—Westinghouse storage batteries. Represented by P. C. Arlington.

C. H. Whall & Co., Boston, Mass.—Whall's special railroad fiber for track circuit installation. Represented by F. R. Whall.

Heavier Steel Rails

ON the subject of heavier steel rails, the following consular report is of interest. The communication from Consul H. A. Johnson in regard to changes on the railway lines, owned and operated by the Belgian Government, was as follows:

While formerly the maximum weight of locomotives used on the Belgian lines was from 40 to 45 tons, the weight of locomotives now in use has dubled, being from 80 to 90 tons, with cars of from 20 to 25 tons in weight. So far the heaviest used are what are known as the Vignole rails, having a maximum weight of 40.65 kilos, or about 125 pounds per meter (39.37 inches.) A limited number of heavy weight rails, it is true, have already been placed on these lines, but their use is confined to crossings, branchings, and switchings only, their weight being 52 kilos, or 114 pounds per meter.

The weight of the new rail with which experiments are being made is 57 kilos, about 125 pounds per meter. The line selected for experimental purposes is that from Liege to Germany, the immediate locality of the experiment being on that part of the line between Liege and Welkenraedt, a distance of some 39 kilometers (kilometer 0.62 of a mile), bringing the total length of double track to about 60 kilometers, necessitating the use of something like 6,000 tons of rails. It is obvious that the use of these heavier rails will necessitate corresponding modifications in other appliances on the lines affected by the change. The fish joints, for instance, which, with the 89-pound rail, are 60 centimeters (centimeters 0.3937 inch), with the new rails will be double, or 1.20 meters. Sleepers that are now placed at a distance of 80 centimeters apart will, with the 125-pound rail, be separated by a space of only 50 to 60 centimeters.

The proposed change will, in all probability, require an increase in the force of workmen employed on these roads, as the rails, being about 18 feet in length and weighing a ton each, will require special tools and more men to handle them than are needed for the rails now in use. Should the results of this experiment warrant it the proposed change will be made on all lines owned and operated by the Government, and these, as is well known, form the greater portion of the railway lines of Belgium. The rails used in making these experiments are furnished by the three most important steel works of Liege under joint agreement.

Annnal Convention of the Association of Railway Superintendents of Bridges and Buildings

THE seventeenth annual convention of the Association of Railway Superintendents of Bridges and Buildings was called to order by President J. H. Markley at 10 a. m., October 15. The convention covered a period of three days, October 15, 16 and 17, which was devoted for the most part to addresses and discussions of reports.

After the meeting was called to order, Hon. Sherburn M. Becker, Mayor of Milwaukee, delivered an address of welcome in behalf of the city. In his remarks he called attention particularly to the industrial development of Milwaukee.

The opening address was delivered by Mr. R. H. Aishton, general manager lines east of the Missouri river, C. & N.-W. Ry. He spoke of the development to the highest degree of efficiency of men, materials and methods by the association and also the education which is furnished the members by this association. He mentioned the fact that railway officials observed the recommendations of the association, remarking in this connection upon the importance of certain subjects for discussion, including smokejacks, sliding doors for freight houses and protection of bridges against the action of brine. He also brought out the point that the recommendations of several associations are being considered by the American Railway Association.

The address of Mr. Aishton emphasized the fact that railway officials take particular notice of the recommendations of the various associations. The feeling expressed in his speech might be looked upon as very general among railway men. There can be no better encouragement to the associations than this recognition and acknowledged appreciation of effort. Mr. Rittinghouse replied to Mr. Aishton, thanking him for his appreciation of the efforts of the association.

The address of President J. H. Markley was of much benefit to the members. He laid particular stress upon self-reliance, advocating on the part of the members independence, stamina, stability or self-reliance. He advised that a man who surrenders his judgment to others would never attain these qualities and that a man who was continually asking for advice, would never amount to much.

The sentiments expressed by President Markley should

be taken seriously. It was not meant that a man should act rashly, but that he should study carefully the problems which confront him, and thus become capable of independent action and master of the work he has in charge.

The morning session was closed with reports of the committee on membership, executive committee, committee on relief and also reports of the secretary and treasurer. These reports were accepted and will be published in the proceedings.

The afternoon session was opened with an address by Mr. W. H. Finley, assistant chief engineer, C. & N-W. Ry., on the Quebec bridge disaster. In his address he compared the design of this bridge with others of American and English type, stating that the failure does not invalidate the Quebec type of bridge. Mr. Finley expects to see a new bridge, designed on practically the same lines, erected over the old scrap heap as a monument to the engineering profession.

Under the subject of new business, the question of changing the name of the association was discussed. It was thought by some members that the name of the society caused certain railroad men to believe that they were ineligible for membership. By vote of the convention, the name remains unchanged. The date of the annual meeting was considered in regard to the advisability of a change to accommodate the members, but it was decided to have the next annual meeting at the usual time.

The discussion of the reports of last year was next in order of business. The method of watering stock in transit was discussed by several members, who gave accounts of the practice on their roads. The method of sprinkling stock in transit varies, both the hose and standpipe being in use. The economy of the standpipe depends upon the location of the road and also the amount of stock handled. The best method of watering stock seems to be to unload them at yards for this purpose, situated at certain places along the line. Mr. Clark spoke of the method of watering and feeding stock on the B. & O. R. R., between Chicago and the east, stating that pens were located at Pittsburg and Baltimore. Pens for a few car loads may be put up at all terminals to cover delays.

In reviewing the recent practice in coffer dam work, President J. H. Markley related his experience at Peoria, Ill., where he had to drive piling around an old bridge pier through about 10 ft. of rubble stone. The frame of the large cofferdam was made large enough to avoid most of the stone. It was found necessary to drive piling for a second dam, inside of the first and just large enough to allow work to be carried on between the dam and the old pier, because only about half of the piling for the first dam reached bed rock.

In the matter of the construction of bumping posts for passenger and freight cars, the discussion referred particularly to the most economical type. Some prefer the pile bumping post, while others prefer the patent bumping post on account of its stability. In one case mentioned, the bumping post was done away with and 3-in. blocks were placed on the rails. This practice was resorted to on spur tracks, near the water edge, to prevent cars running into the bay. It required more attention, of course, on the part of the trainmen.

The convention next proceeded to a consideration of the standing subjects. The construction and design of pile and frame trestle bridges was discussed at length, many members relating the practice on their roads. The size, length and number of stringers varies with the weight of rolling stock on the roads.

The convention was favored with a talk on the strength of timber by Dr. W. K. Hatt, professor of civil engineering at Purdue University, and civil engineer of the Forest Service of the U. S. Department of Agriculture. He stated that the Forest Service is engaged in a practical and scientific investigation of the strength of timber and that it has several laboratories located at various points across the country. He discussed the elements, influencing the strength of timber, with reference to stringer timber particularly. The first element is the amount of heart and sap woods, which depend for their influence upon their location in the cross section, having no destinction between their relative strengths. The second element is the annual growth, a tree that grows fast usually being weaker than one of slow growth, and also a tree with a large amount of hard summer wood being stronger in proportion than one with a smaller amount. The third element is the seasoning of wood, which in the case of select Douglas fir increases the strength about 30 per cent., but which does not increase the strength over a green stick, if the wood begins to check or crack radially on seasoning. The fourth element is the knot, the location and not the size affecting the strength. Remarks upon the value of several timbers were as follows: Loblolly pine grows fast and has a variable strength; Long Leaf pine has a more constant growth; Douglas fir gives clear heart wood, the color not affecting the strength; Douglas fir is not the equivalent of Long Leaf pine in hardness and durability, but it is the equivalent in strength, and Short Leaf pine is intermediate between Long Leaf pine and Douglas fir. This information will be given out later in pamphlet form by the Forest Service of the U. S. Department of Agriculture.

Under the subject of water supply, Mr. C. E. Thomas, chairman of the committee, submitted in tabulated form the results of tests made on the I. C. R. R., which show results obtained under different conditions at several pumping stations on the road.

The fire protection of bridges and buildings was discussed at length. In the discussion it developed that some roads use only the water barrel, while others use galvanized iron on both caps and stringers. The latter protection increased the life of trestles which were previously subject to frequent fires. President J. H. Markley, T. P. & W. Ry., stated that it was customary on his

road to allow the timber to season for one year and then to cover both caps and stringers with galvanized iron. Mr. Killam, Intercolonial Ry., recommended the use of zinc or galvanized iron nails and also the immediate removal of decayed timbers. Mr. Penwell, L. E. & W. Ry., also recommended that all rotten timbers should be trimmed off.

The report of the committee on fences, road crossings and cattle guards consisted of extracts from replies to a circular letter. Line drawings illustrate the type of construction used on several of the roads. The committee on this standing subject was composed of the following members: W. M. Noon, D., S. S. & A. Ry., chairman; A. McNab, Pere Marquette R. R.; W. A. Fort, Southern Ry., and F. W. Tanner, Mo. Pac. Ry.

PRESERVATIVES FOR WOOD AND METAL.

The standing subject, preservatives for wood and metal, was discussed at length. The chairman of the committee, J. F. Parker, Southern California Ry., submitted a report, covering his experience and observations. In the discussion Mr. Harwig, L. V. R. R., stated that creosoted piles and stringers, used on a dock for 25 years, are as good as new, both above and below the water line. Mr. Penwell, L. E. & W. Ry., called attention to the use of crude oil as a preservative for timbers and the importance of cleaning bridges thoroughly before repainting. Mr. A. S. Markley remarked it is well to fix up the bad spots until the time comes when it is necessary to repaint the entire structure. Mr. Killam, Intercolonial Ry., recommends the use of red lead for the first coat and the use of other paint for the second coat. Extracts from Mr. Parker's report are as follows:

"In July I inspected a bridge 375 ft. long which was re-driven after being washed out in 1889. About one-half of the bridge was driven with creosoted piles, and not having creosoted piles of suitable length, the other half was driven with untreated piles, both of Oregon fir timber. The untreated piles have been renewed once since and must be renewed again this year, while the creosoted piles are in good condition. This shows conclusively what creosote will do for the preservation of wood. We have used some Arizona pine timber and piling, also a considerable number of track ties treated with the zinc chloride process, but with us this treatment has not proved to be much of a success. Salt is a very beneficial wood preserver. Timber that is thoroughly impregnated with salt will resist decay for a long time. This has been proven here by using old piles from wharves that had been standing for a number of years in sea water. These, when driven in bridges on land, have been found to resist decay for more than double the time of that of the plain timber.

"Crude oil has been used on this division during the last ten years on wooden bridges with good results. It has been our practice to apply it liberally to bents and deck. It prevents to a large extent the formation of rotten pockets and checking of timber, as it penetrates the wood instead of forming a surface coat. It also greatly improves the appearance of the structure over raw wood. The seasoning of timber also adds to its life. It has been proven here that the life of a sawn Douglas fir cross tie when put in the track green is not over three or four years; while the life of the same, thoroughly seasoned, is about double that time.

"As to metal preservers, I will say that we have used several kinds of paint with varying success, but the best results have been attained with the use of red lead mixed with linseed oil. Much depends upon the quality of the oil; in fact, the oil is the life of the paint. The less the adulteration of the oil the better and more lasting will be the work accomplished. The steel should be thoroughly cleaned and one or two coats of this paint applied. Care must be taken to rub the first coat firmly and uniformly onto the metal when it is dry, leaving no pores unfilled, as the perspiration of the metal will work out on such places and rust will appear. After having established a good base of red lead paint, two coats of any good paint should be applied, of any color to suit the owner. This makes a job that will be the most economical in the long run. It is a mistake after a bridge has been cleaned off for painting to turn the job off with only two coats of paint, and in a year or so to see rust appear through your work."

WOODEN AND ASBESTOS SMOKE JACKS.

On Thursday, October 17, the reports of committees of investigation were considered. No report was submitted by committee No. 1, on experience in concrete bridges, arches and subways. The report of committee No. 5, on recent experience in the use of wooden and asbestos smoke jacks, was read by Mr. Lichty, C. & N-W. Ry. With this report are incorporated letters from 25 members, which give information as to the practice on various roads. Several types of jacks are shown in sectional drawings. The committee was composed of the following members: M. J. Flynn, C. & N-W. Ry.; C. A. Lichty, C. & N-W. Ry.; D. L. McKee, P. & L. E. R. R, and A. F. Miller, Penn. Lines West of Pittsburg. Extracts from the report are as follows:

"Jacks are made in all conceivable shapes, sizes and forms, to meet certain requirements and conditions in the different kinds of engine houses, but generally they are classed as two distinctive types, the one having the telescopic drop section fitting down closely over the stack of the locomotive after it has been placed, and the other having a large flaring section which is stationary, under which the engine may be placed without accuracy, and is larger proportioned in every way than the first named type. The latter named style answers to a greater extent for ventilation on account of its larger dimensions and must necessarily allow the escape of more heat in cold weather unless special arrangements are made to avoid it.

"It is well known that the various forms of iron and steel when used for this purpose decompose very rapidly, cast iron being better adapted than wrought iron or steel, but these when made thick enough to last any considerable length of time are cumbersome and expensive and

often crack during the first season owing to contraction and expansion. The sheet iron jacks last ordinarily only two to five years.

"Stoneware, or earthenware, commonly designated as tile, has been extensively used for jacks, and a considerable number of such jacks are still in use; but in northern climates they are being gradually abandoned and replaced with other kinds on account of being cumbersome and cracking when being subjected to extreme heat and cold. This form of jack usually consists of several joints of tile mounted upon a roof casting and surmounted by a sheet metal cap, and having either a telescopic section or a stationary hood under the roof, made in either case of iron or copper. This lower section, and the cap, are subjected to rapid disintegration and have to be renewed frequently.

"Wood seems to withstand the action of the gases better than metal and it has been successfully used by some roads for many years without any trouble whatever, while other roads experienced loss from fire and many are prone not to use them, fearing similar results.

"Various compositions of asbestos, cement, etc., have been extensively experimented with in recent years, many of which proved to be short-lived, and none to date have stood the test sufficiently long to prove that they are worth the price which is charged for them, regardless of the fact that they may be guaranteed by the manufacturers for a specified term of years."

COMBINATION FASTENING AND LOCK FOR ROLLING AND SLIDING DOORS.

The report of committee No. 6 on combination fastening and lock for rolling and sliding doors on freight houses and other buildings, was considered next. The committee was composed of the following members: C. A. Lichty, C. & N-W. Ry., chairman; H. Rettinghouse, C. & N-W. Ry.; J. L. Talbot, A., T. & S. F. Ry., and W. T. Powell, C. & S. R. R. This report was also accompanied by letters from the members, illustrated with line drawings. Mr. Lichty read the report, of which the following extracts are given:

"The various styles and sizes of doors on the different railroad buildings require a variety of locks and fastenings. Simplicity and cost are the two main items to be considered, yet the importance of security and effectiveness must not be lost sight of in connection therewith. As a general rule the simpler the contrivance the easier and cheaper to maintain, and often more effective than those more complicated and expensive.

"The committee finds that it is generally the custom, in the case of a large freighthouse or warehouse, where there are a number of doors, to fasten all but one door from the inside, and the exit door, whether it be one of the large doors, or a small door leading to the office, secured in some way from the outside. If one of the larger doors be used as a final exit, it is generally fastened with the ordinary hasp and staple with common padlock. In case a small door is used it is customary to fasten it by methods used on all ordinary small doors.

"Horizontally rolling or sliding doors, fastened from the inside, are usually locked by placing a pin in a hole in the back of the door in a post; or common hook and staple or box car door fastener, or other simple contrivance holding the door to the front post.

"Vertically sliding doors or those raised and lowered on pulleys require a hook or lever fastening which may be very simple in its design.

"Kinnear doors, or curtain overhead rolling doors raised and lowered with a chain, are fastened by simply blocking the chain in a slot with a nail.

"Knee doors are fastened at the side near the knee joints, by any means holding it to the posts, which ordinarily consist of a lever similar to those on a large refrigerator car door, or a door bolt attached to the door and fastened to the posts.

"Engine house doors are most commonly held in place by use of the old style wooden cross bar, extending from post to post, and the doors fastened to these by use of hooks.

"Freight rooms and express rooms which have but one rolling door are sometimes locked with a combination lock and fastening, the fastening being a projecting hook which, when the door is closed, catches in a mortised plate set in the wall, or rather in the post, and is unfastened with an ordinary key being inserted in the lock from the outside. Another design is used by the Boston & Maine Ry., which consists of an ordinary hook latch, unfastened from the outside by throwing the bolt of a rim dead lock with the key."

Committee No. 7, on construction of tower and guides for lights on drawbridges, submitted a report, consisting of replies to a circular letter illustrated with line drawings. The committee was composed of the following members: J. N. Penwell, L. E. & W. Ry., chairman; F. Ingram, L. & N. R. R.; G. W. Rear, Southern Pac. Co., and G. J. Klumpp, N. Y. C. & H. R. R. R.

PROTECTION OF STEEL BRIDGES AGAINST ACTION OF BRINE.

The report of committee No. 8, on recent experiments in protecting steel railroad bridges against the action of salt brine from refrigerator cars, was discussed generally. The committee was composed of the following members: R. P. Mills, N. Y. C. & H. R. R. R., chairman; A. Montzheimer, E. J. & E. Ry.; W. G. Berg, L. V. R. R.; F. O. Draper, I. C. R. R., and Charles Carr, M. C. R. R. Extracts from the report are as follows:

"The committee is agreed upon two features of the problem, viz.: That the proper remedy for the trouble is in so constructing the cars that the brine can be retained till some station is reached where it can be drawn off by the train hands without injury to structures; and that no paint has been found that is effective in protecting the metal.

"Mr. Montzheimer says: 'It seems to me the best way to obviate this trouble is to have the drips from the refriberator cars piped to the center of the track and then protect our bridges so that water dripping on the center of the track will not go to the steel work.'

"Mr. Draper sent a sketch of a protection that is proposed to be tried on his road, saying: 'I am sending you a print showing the proposed method of protecting our floor system from salt water and also from the weather in general. It is a galvanized iron box trough used as a spacing block between the ties, and made with a pitch in order to turn the water off very rapidly. This protects our floor system from the rust from the rails, which is as bad as salt brine in destroying the paint. We have used on this road all classes of paint, but have not found anything that will overcome salt water, and I think that in the future we will have to resort to this method of covering to keep off the dirt, rust and salt water from the steel. Our estimated cost of putting on an ordinary deck on a steel structure is $4.50 per foot for labor and material. This method of covering will add an additional cost of $1.65 per foot, making a total of $6.15 per running foot; and I am satisfied that we will receive better results by keeping our steel work properly covered with paint. This, you will note on the plan, is to be used for deck plate girders, through plate girders and through truss spans. The girders and spans where we have the corrugated floor system and use a 6x8 yellow pine tie, should be covered on the outside of the rail with 1½-in. matched lumber. This will overcome the drip from falling direct on to the steel.'

"Your chairman wishes to recommend that all equipment which scatters salt brine along the line of tracks be provided with a copper tank on each car with sufficient capacity to hold all the salt brine that may be made from melting ice, and have it emptied at destination of car, or at points where such car is re-iced. The practice of scattering salt brine should be stopped; and it can be stopped much cheaper and with better results than for us to try to protect our structures from such action, which we are sure to fail in.

"In 1898, at the Richmond meeting, a report was made on this subject in which it was estimated that one refrigerator car would produce about 200 gallons of brine in twenty-four hours. The suggestion was made that the cars be piped so that the brine shall be discharged at center of track and the structures provided with troughs to carry it clear of the metalwork.

"In the discussion of this report tanks were suggested and a method of filling between the ties with blocks bedded in paint somewhat similar in principle to Mr. Draper's scheme. President Berg stated that the Master Car Builders' Association had considered this matter and a committee had submitted two schemes, one of which, consisting of piping to center of track and discharging through a hose reaching nearly to the ground, was adopted by the association as 'Recommended Practice.'

"At the Quebec meeting in 1903 the subject was discussed. In the report Mr. Benjamin Douglas, of the Michigan Central, described his method of applying asphalt to floor plates by heating the iron and pouring on hot asphalt. This formed a sort of enamel, the asphalt adhering to the iron perfectly. A modification of this method could be applied to ordinary floors affected by brine drippings.

"It was also suggested at this meeting that tops of stringers and floor beams be covered with ready roofing or similar material as a protection from brine. Several members promised to try it and report at future meetings. It is hoped that the experience gained will be brought out at our meeting this year.

"At the Pittsburg meeting, in 1905, the subject was again reported upon and discussed. Mr. Reid, of the Lake Shore and Mr. Cartlidge, of the Chicago, Burlington & Quincy reported on the use of roofing felt on stringers; the latter finding it satisfactory and the former stating that it soon cut through. Mr. Woweth, of the Chicago, Milwaukee & St. Paul, stated that he was trying 'iron bark,' a material made by Edward Smith & Co., being canvas ducking saturated in a preparation of linoxyn and a resinous flux. A recent letter, August 27 last, from Mr. Loweth, states that on several spans of deck girders with creosoted timbers laid close and covered with ballast, the iron bark placed over the girder flanges under timber was in perfect condition after two years' wear. On several standard floor bridges with 4-in. spaces between ties, the iron bark had cut through under the ties or crimped up between them. The material and its application is expensive and except in the case of solid continuous timbering does not seem to be entirely satisfactory. It is the material used for covering the cables of the Williamsburg bridge at New York."

CONCRETE BUILDINGS.

The report of committee No. 2, on concrete buildings, included a report of the specifications for concrete and reinforced concrete work which are embodied in the Building Ordinances of the City of St. Louis. The committee was composed of the following members: A. O. Cunningham, Wabash R. R.; J. J. Fullem, I. C. R. R., and M. Piney, C. & N-W. Ry. Extracts from the report are as follows:

"The objections to solid walls for building purposes are the following: Liability to crack; expense on account of forms, and dampness seeping through the wall. The last two of these objections are found in reinforced concrete walls. Cracks, however, are not liable to develop in this construction because of the reinforcement. These objections may be overcome if proper precautions are taken in the construction. The dampness of the walls may be overcome by painting the exterior surface with a waterproofing compound. There are many of these on the market today which answer the purpose admirably and give the surface of the building a nice and even appearance.

"In constructing buildings of solid concrete, pilasters should be built separately as columns with anchor rods projecting from them, and the intervening wall built between after the pilasters have hardened so as to make a joint at intervals in the concrete. Where reinforced concrete is used, these joints are not necessary, and, in

fact, not desirable as the wall should be built as a unit.

"The forms are an expensive item in both these kinds of construction, but their cost can be largely reduced by making a standard section which can be used many times throughout the construction of the building. As the appearance of the building is one of the essentials, forms should be constructed so that a tier of the building may be completed in one day and the forms from that tier moved after twenty-four hours and used for each succeeding tier. In this way the face of the concrete can be treated or patched successfully while green without marring the outside face.

"To overcome the objections to the above, many advocate the use of the concrete building block, and there are a large number of different makes of machines on the market for molding them. These blocks are provided with a hollow space so as to prevent the moisture from reaching the inside of the building. There are the following objections to the use of these blocks:

"It is very difficult to form them without there being some blemish on the surface, and which it is impossible to properly remedy. The molded blocks never have the sharp outlines which are necessary for good appearance. The construction of blocks must be very carefully watched, otherwise through the incompetence of the workmen or dishonesty of the maker, a very small amount of cement is used in their composition, with the result that they are very fragile and readily broken. Several cases have occurred where buildings built of blocks have fallen down of their own weight on account of the "lean" mixture used in the make-up of the blocks. Most of these blocks are very porous because of the fact that they have to be made with a dry mixture. Only those blocks should be used that can be made with a wet mixture and pressed with great power, and all blocks made by hand tamping with dry mixture should never be used.

"Plaster on expanded metal is cheap and answers the purpose satisfactorily for all kinds of shop buildings and for cheap small buildings. This construction, however, has been used with success for elaborate buildings in California and the southern states, and many beautiful residences are being built today by this method. It consists of a framework of wood or steel, with metal lath attached to the outside surface, which is coated with mortar on both sides, forming an exterior wall over an inch and a half in thickness. On the interior framework metal lath may also be attached and plastered on the inside. Thus in this latter construction a hollow wall is formed with an air space which affords perfect protection against dampness and is a good insulator for heat and cold. The outer face of the exterior wall is usually coated with a waterproofing compound. This form of construction permits of elaborate details at small expense."

EXPANSION AND CONTRACTION OF CONCRETE WALLS.

The report of committee No. 3, on experience as to expansion and contraction of concrete walls, either reinforced or plain concrete, was presented and discussed. Several members related their experience with concrete construction. The committee was composed of the following members: A. S. Markley, C. & E. I. Ry., chairman; W. A. Rogers; R. H. Reid, L. S. & M. S. Ry., and P. J. O'Neil, L. S. & M. S. Ry. Extracts from the report are as follows:

"In walls that are exposed to natural atmospheric changes in temperatures on all sides, provisions must be made for wall movement, more than if only surface is exposed, the other portions being protected by embankment, etc. Retaining walls 200 ft. long and over, 10 to 20 ft. high, should have an expansion joint every 45 to 50 feet, as conditions require them. Concrete curbs 4 to 5 ft. wide, 6 ins. to 12 ins. thick, should have an expansion joint every 5 ft. square.

"Reinforcing used in concrete will, to a certain extent, prevent concrete from separating, but will not prevent slight cracks from appearing on the surface. These cracks do not confine themselves to any particular direction, though usually running vertically and horizontally, the former appearing from 3 to 4 ft. apart in curbs 350 ft. long, 8 ins. wide, reinforced with five half-inch Johnson corrugated bars distributed throughout the curb. The horizontal cracks are not so frequent and irregular. Corrugated bars being partly protected by the concrete from atmospheric changes, make the expansion between the bars and concrete unequal, to which the cracking above referred to is attributed, the two expanding about equally under same temperature and exposure. These cracks are not due to shrinking, which only appears at initial setting of concrete, but to expansion and contraction, they appearing thirty to ninety days after job is completed and after passing through a shrinking period.

"Joints in wall and curbs should be made dovetail, so as to maintain a true alignment of the wall on the exposed surface. Various methods are employed in making the joint, one of which is to use a sufficient number of layers of felt paper to obtain the desired thickness and cushion. Another practice, in large retaining walls, is to build each alternate section dovetailed together, allowing each alternate section to be thoroughly seasoned before succeeding section is built, and allowing disconnected joint to provide expansion in this manner, which appears to be most satisfactory.

"Expansion in sidewalks, or similar work, is overcome by cutting through the concrete before finished surface is applied, leaving a space sufficiently filled with dry sand, or open, as desired.

"Where artificial or natural temperatures are maintained uniformly at all times, expansion joints can be dispensed with, as in subways, dams, smokestacks, buildings, and constructions of similar nature. Tunnels 750 ft. long, with lateral tunnel diverging at righ tangles from center of main tunnel for 350 ft., through which steam, water and air pipes are hung, have been built and in service for the past three years, and no indication of cracks can be seen. In this case, the temperature

varied from 110 to 175 degs. inside of tunnel. The tunnel constructions are of concrete 4½ ft. wide throughout, 5½ ft. deep from surface of ground at one end and 3 ft. at terminal, the side walls and bottom 12 ins. thick throughout, and the cover 4 ins., the cover being bonded to sides of tunnel, reinforced with No. 8 expanded metal 1 in. from lower side and troweled on the surface. The cover is used as a sidewalk and a truck-way for trucking material from different buildings, it being at the surface of the ground. In putting on the cover, light expansion joints were made by cutting through concrete every 5 ft. at joint of each sheet of expanded metal before putting on top dressing, filling joint with dry sand to 1 in. below surface. No expansion has taken place whatever in any of these walls, including cover, no provision having been made in side walls or bottom for expansion. Had any taken place, it would have been noticed by cracks appearing on the surface, close observation having been made at intervals of different temperatures of the weather and under all conditions. Even temperatures were maintained by heat from pipe in the tunnel to supply steam, etc., to buildings.

"In conclusion, there is no set rule that can be given to guide the expansion and contraction, local conditions and sub-grade entering into the amount of expansion to be provided for. Floors and sidewalks built on cinders or material that attracts heat require more expansion provisions than those built on soil, which does not attract heat so readily. This same rule would also apply to floors protected from the sun in basements, or similarly located."

ACTION OF SEA WATER ON CONCRETE.

The report of committee No. 4, on action of sea water on concrete, consisted of replies to a circular letter. The committee was composed of the following members: G. Aldrich, N. Y., N. H. & H. R. R., chairman; W. A. Pettis, N. Y. C. & H. R. R. R.; G. W. Andrews, B. & O. R. R., and J. E. Barrett, L. & H. R. Ry. Mr. Aldrich brought some photographs to the convention, showing the disintegration of piers at the Charlestown Navy Yard. Extracts from the report are as follows:

"Your chairman has made it a particular object to examine quite a number of structures of concrete in tide water in the vicinity of Boston, and has found in every structure examined disintegration was taking place with more or less rapidity between high and low water, in some cases, notably the arches under the piers at Charlestown Navy Yard, this disintegration being to such an extent as to seriously affect the stability of the work. Your chairman has been informed by those who are constantly on the work at these different places that this disintegration was considerably more rapid in cold weather when frost was experienced than at other times, although disintegration occurs even in warm weather. In some cases the concrete scales off in quite large patches, but in most of these cases it comes out in small particles, so that the stones which form a part of the concrete were left projecting out from 1 in. to 2 ins. beyond the general surface, or until such time as the weight of the stone would offset what little holding power remained to the concrete at the inner point of the stone.

"Your chairman finds the same trouble with granite above low water. He has examined several places where the mortar has disappeared in the joints and had to be repointed after 3 or 4 years.

"Your chairman has also looked over a concrete pier on the Providence river, at Warren, R. I., which was built about 25 years ago with a mixture of sand and cement of about 1 to 3. This concrete is in a good state of preservation, except between high and low water, where it is worn away in places from 4 to 8 ins., which looks as if it was done more by the current and ice as the tide ebbs and flows, rather than by the combined action of frost and tide water rising and falling. The current at this point runs at about the rate of 8 miles per hour, which is pretty fast, and causes quite a whirlpool as it passes the pier.

"As before mentioned, your chairman noticed near the same place granite abutments where the pointing was all gone between high and low water, above high water the pointing was in good condition.

"It is the opinion of your committee that depositing concrete direct into sea water is the cheapest and best method of sinking concrete into sea water, and if properly mixed with proper material and properly handled and faced with granite above low water, that with a suitable number of headers to make granite masonry firm, it will do good service. Your committee also thinks that it would add to the stability of the granite if the joints were calked with lead."

The officers elected for the year 1907-'08, are as follows: R. H. Reid, L. S. & M. S. Ry., president; J. P. Canty, B. & M. R. R., first vice-president; H. Rettinghouse, C. & N-W. Ry., second vice-president; F. E. Schall, L. V. R. R., third vice-president; W. O. Eggleston, Erie R. R., fourth vice-president; S. F. Patterson, B. & M. R. R., and C. P. Austin, B. & M. R. R., treasurer. The executive members are as follows: A. E. Killam, Intercolonial Ry.; J. S. Lemond, Southern Ry.; C. W. Richey, Penn. R. R.; T. S. Leake, Mo. Pac. Ry.; W H. Finley, and J. N. Penwell, L. E. & W. Ry.

The next annual convention will probably be held in Washington, D. C.

The standing subjects to be considered at the next convention are as follows: (1) "Pile and Frame Trestle Bridges"; (2) "Fire Protection"; (3) "Fences, Road Crossings and Cattle Guards"; (4) "Construction of Cofferdams"; (5) "Preservation of Timber," and (6) "Coaling Stations and Cinder Pits." The special subjects are as follows: (1) "Waterproofing of Concrete-Covered Steel Floors and Subways"; (2) "Modern Equipment and Tools for the Erection of Steel Bridges"; (3) "Protection of Structures Against Effects of Electric Currents"; (4) "Protection of Embankments from Effect of High Water by Riprap or Otherwise"; (5) "Experience in the Use of Gasoline or Kerosene En-

gines or Combination of Same for Water Supply, Drawbridges, etc."; (6) "Modern Dwelling Houses for Section Foremen and Section Men in Outlying Districts"; (7) "Reinforced Concrete Culverts and Short-Span Bridges", and (8) "Method of Erecting Truss Bridges, (a) Maintaining Traffic, and (b) No Traffic."

A permanent organization, known as the Bridge and Building Supply Men's Association, was formed by the exhibitors at this convention. The following officers were elected: President, Charles Ernshaw, manager Standard Paint Company, New York; vice-president, W. W. Johnson, Franklin Manufacturing Company, Chicago; secretary, T. R. Wyles, vice-president Detroit Graphite Company, Detroit, Mich.; and treasurer, S. Reid Holland, Eastern Granite & Roofing Company, Chicago. The executive committee is as follows: For term of one year, F. J. Johnston, American Hoisting Derrick Company, St. Paul, Minn., and H. A. Nealley, Joseph Dixon Crucible Company, Boston, Mass.; for term of two years, J. T. McGary, American Valve & Meter Company, Cincinnati, O., and C. C. Lazenby, Otto Gas Engine Works, Chicago, and for term of three years, H. C. Durre, St. Louis, Mo., and M. J. Eames, Sherwin-Williams Paint Company, Chicago.

The exhibitors at the convention were as follows:

Allith Manufacturing Company, Chicago, Ill.—Underwriters' automatic fire door equipment, parallel door equipment for freight stations, warehouses, etc., reliable round track door hangers, merchandise carriers. Represented by W. D. Jameson.

American Hoist & Derrick Company, St. Paul, Minn.—Photographs of American ditching machines. Represented by F. J. Johnson, Oliver Crosby, W. O. Washburn.

American Valve & Meter Company, Cincinnati, O.—Catalogues, blue prints, etc., describing its standpipe float valves, tank fixtures, switchstands, etc. Represented by N. Paul Fenner, Jr., J. T. McGarry.

Barrett Manufacturing Company, New York, N. Y.—Samples of roofing and Barrett's specifications, also Tar-Rok for sub-floors, a suitable surface on which to bed plank when a wooden lower floor is desired in machine shops, etc. Represented by L. P. Sibley, W. J. Walker.

Bird, J. A. & W., & Co., Boston, Mass.—Samples of Rex Flintkote roofing, Ibex building and insulating papers, Bird's bullseye belting, Ripolin enamel paint, Rex Flintkote roof paint. Represented by E. V. Everett, C. P. Caswell, J. G. Campazzie.

Buda Foundry & Manufacturing Company, Chicago, Ill.—Buda carborundum tool grinders, bridge jacks, crossing gates. Represented by V. A. Swett, H. L. Shephard.

Carbolineum Wood Preserving Company, Milwaukee, Wis.—Wood preservative for bridge timbers, railroad ties and timber of all kinds. Represented by A. L. Becker, Albert Leypoldt.

Carey, Philip, Manufacturing Company, Cincinnati, O.—Samples of Carey's roofing and paints. Represented by J. P. Stagg, S. J. Bowling, D. A. Bonitz.

Detroit Graphite Company, Detroit, Mich.—Literature describing the uses of their paints for railway service. Represented by S. L. Brown, T. R. Wyles.

Dickinson, Paul, Inc., Chicago, Ill.—Dickinson cast iron smokejacks, chimneys and ventilators for roundhouses and other railroad buildings. Represented by J. A. Meaden.

Dixon, Joseph, Crucible Company, Jersey City, N. J.—Dixon's silica graphite paint for protection of steel bridges. Represented by H. A. Nealley, E. R. Smith.

Durie, N. C., Company, St. Louis, Mo.—Samples of malleable iron washers. Represented by N. C. Durie, C. B. Hutchins.

Eastern Granite Roofing Company, New York and Chicago.—Samples of granite roofing, photographs of buildings showing the roofing in use, also a sample of granite roofing in good condition taken from a building after 14 years' exposure. Represented by H. Henning, Edward O'Neill, H. S. Cheney, S. Reid Holland.

Fairbanks-Morse Company, Chicago.—Represented by A. A. Taylor, W. H. Stearns, C. W. Kelly, W. H. Smith.

Franklin Manufacturing Company, Franklin, Pa.—Samples of asbestos lumber and asbestos shingles. Represented by Wallace W. Johnson.

Houghton, E. F., & Co., Chicago, Ill.—Vim leather packings for deep well pumps, air brake leather packings made from Vim tannage of leather. Represented by William J. H. Weaver, A. C. Bass.

Johns-Manville, H. W., Company, Chicago, Ill.—Samples of asbestos and magnesia roofing, pipe coverings, smokejacks and the usual variety of asbestos and magnesia products. Represented by F. M. Gilmore, J. C. Younglove, W. F. Taylor, C. E. Murphy, W. K. Bush, J. A. Meek.

Long, Charles R., Jr., Company, Louisville, Ky.—Samples of railway station and bridge paints. Represented by Charles R. Long, Jr.

MacFarland, J. C., & Co., Chicago, Ill.—Hollow metal frames and sashes for office, mercantile and factory buildings, showing Alpha double-hung metal window. Represented by Harold Hooker.

National Roofing Company, Tonawanda, N. Y.—Samples of roofing and roof paints. Represented by W. D. Cleland, B. G. Casler.

Natural Carbon Paint Company, Freeport, Ill.—Samples of metals protected with Mindura, showing effect of several years' wear under railroad bridges. Samples of pigment and the ore from which this pigment is prepared. Mixed paints and semi-paste. Represented by A. M. MacFarland.

Otto Gas Engine Works, Chicago, Ill.—Photographs and drawings of coaling stations, water softening plants, etc. Represented by T. W. Snow, C. C. Lazenby, R. E. Gurley.

Rendle, Arthur E., and the Western Paradigm Company, New York and Chicago.—Full-sized models of skylight and fireproof windows, glazed with ribbed skylight glass and wire glass, with detail drawings of all parts. Represented by Harold Hooker.

Standard Asphalt & Rubber Company, Chicago, Ill.—Asphalt waterproofing for concrete structures, bridge floors, damp-proofing for buildings, protection against electrolyses, mastic flooring, pipe dip, brick paving with asphalt filler. Represented by W. H. Lawrence.

Standard Paint Company, New York, N. Y.—Samples of Ruberoid roofing and flexite paints. Represented by Charles Earnshaw, B. C. Beckman.

Stover Motor Car Company, Freeport, Ill.—A 6-passenger gasoline motor inspection car. Represented by J. P. Stover, M. Mowbray.

Stowell Manufacturing & Foundry Company, South Milwaukee, Wis.—Wilbern adjustable hanger for freight houses and warehouse doors, automatic fire doors, latches for roundhouse and warehouse doors. Represented by R. A. Nourse.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Mansfield and U. S. water columns. Represented by Laurens E. Wolcott, R. E. Derby.

Prices on Track Materials, F. O. B. Chicago

TRACK SUPPLIES.

Steel Rail, 60 lbs. and over	$28.00 per gross ton
Steel Rail, 25 to 45 lbs.	32.00 per gross ton
Steel Rail, 20 lbs.	33.00 per gross ton
Steel Rail, 16 lbs.	34.00 per gross ton
Steel Rail, 12 lbs.	35.00 per gross ton
Ties, 6x8x8 oak, 1st grade	77c each
Ties, 6x8x8 oak, 2d grade	67c each
Switch Ties	$30.00 to $35.00 M. ft.

Angle bars, accompanying rail orders, 1907 delivery, 1.65c.; car lots, 1.75c. to 1.85c.; spikes, 2.00 to 2.10c., according to delivery; track bolts, 2.50c. to 2.60c., base, square nuts, and 2.65c. to 2.75c., base, hexagon nuts. The store prices on track supplies range from 0.15c. to 0.20c. above mill prices. Switch set per turn out, 60-lb. rail, $85 to $90.

OLD MATERIAL.

	Per Gr. Ton	Per Ton
Old Steel Rails, rerolled	$17.00 to	$17.50
Old Steel Rails, less than 3 ft.	16.00 to	17.00
Old Iron Rails	20.00 to	20.50

SHEET STEEL.

It is quoted for future delivery:

Tank plate ¼-in. and heavier, wider than 6¼ and up to 100 in. wide, inclusive, car lots, Chicago, 1.88c. to 2.08c.; 3-16 in., 1.98c. to 2.18c.; Nos. 7 and 8 gauge, 2.03c. to 2.23c.; No. 9, 2.13c. to 2.33c. Flange quality, in widths up to 100 in., 1.98c. to 2.08c., base for ¼-in. and heavier, with the same advance for lighter weights; Sketch Plates, Tank quality, 1.98c. to 2.18c.; Flange quality, 2.08c. Store prices on Plates are as follows: Tank Plate, ¼-in. and heavier, up to 72 in. wide, 2.20c. to 2.30c.; from 72 to 96 in. wide, 2.30c. to 2.40c.; 3-16 in. up to 60 in. wide, 2.30c. to 2.40c.; 72 in. wide, 2.50c. to 2.65c.; No. 8 up to 60 in. wide, 2.35c. to 2.45c.; Flange and Head quality, 0.25c. extra.

STRUCTURAL STEEL SHAPES.

Store quotations are unchanged at 2.05c. to 2.10c., and mill prices are as follows: Beams and Channels, 3 to 15 in., inclusive, 1.88c.; Angles, 3 to 6 in., ¼-in. and heavier, 1.88c.; larger than 6 in. on one or both legs, 1.98c.; Beams, larger than 15 in., 1.98c.; Zees, 3 in. and over, 1.88c.; Tees, 3 in. and over, 1.93c., in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

CAST IRON PIPE.

Quotations per net ton on Water Pipe, 4 in., $37; 6 to 12 in., $36; over 16 in., $35; with $1 per ton extra for gas pipe.

CEMENT.

Good grade Portland Cement, car lots...$2.00 per bbl.*

* (Four sacks per bbl. credited 10c. each when returned in good condition.)

SAND.

Bank sand, car lot	$0.65 per yd.
Torpedo sand, car lot	1.15 per yd.

CRUSHED STONE GRAVEL.

Crushed limestone, car lot	$1.05 per yd.
Crushed gravel, car lot	1.00 per yd.

Tunneling Projects

Important tunneling projects, both under construction and projected, through the Alps region are summarized in the following review from a recent consular report.

The Loetschberg tunnel shortens the approaches to the Simplon from central Switzerland, Germany, and northwestern Europe generally. From the international standpoint, the Loetschberg scheme means that the greater part of the traffic to and from Simplon, which is composed of that originating in England and northern France, will go over the lines by Chaumont, Belfort, Berne, and Thun, instead of via Dijon, Pontarlier, Vallorbe, and Lausanne. It will reduce the length of the journey between Calais and Milan from 725 miles to 672½ miles, and between Paris and Milan from 523 miles to 511 miles.

The total length of the Loetschberg Railway will be 26½ miles, and besides the great tunnel there will be thirty-three others, forming about 22 per cent of the lines of access. The entire contract has been let by a Parisian syndicate of capitalists for the sum of $17,500,000, and the work must be completed and open to traffic by September 1, 1911.

Before leaving the Loetschberg scheme, it should be added that a new and better approach to Berne from the system of the French Eastern Railway is projected, viz., the remodeling of the line from Delle to Delmont and Moutier, and the building of a railway from Moutier to Granges, which would have a long tunnel through the Juras. There would then be no necessity of French trains passing through Basel.

The second Alpine tunnel under construction is the Ricken tunnel, piercing the watershed between the rivers Linth and Thur, on the new railway from Uznach to Wattwyl. The new line, which will exploit a charming tourist district, is only 9 miles long, of which the single track tunnel accounts for 5.34 miles. Although it will not be opened for traffic until next year, the new railway from Salzburg to Trieste—between which it saves 150 miles, thus providing direct communication between the northern part of Austria and the Adriatic, and constituting the last work in the development of the port of Trieste—is very nearly finished. This line is remarkable for the colossal nature of the engineering works. It is carried over numerous great valleys, and across a multitude of rivers, while it attains an altitude of 4,018 feet above sea level. There are also three great tunnels through the northern regions of the Austrian Alps—namely, the Tauern, 5.25 miles; Karawanken, 4.95 miles; and Wochheimer, 3.93 miles; together with shorter ones, making a grand total of 15½ miles of tunneling. The Tauern and Karawanken are double-track tunnels, while the Wochheimer consists of twin single-track perforations.

Turning to what at present are projects only, there is the scheme for a Faucille-Geneva-Mont Blanc railway, which is pretty certain to come to pass sooner or later. Originally the Faucile portion of the scheme was put forward as a short cut to the Simplon, but it was vetoed in Switzerland, owing to the preponderating influence of the German cantons, as being too tributary to French interests. However, the claims are now being revived by the French and Italians in conjunction with the proposed Mont Blanc Railway. The following is the route: A line from Lons-le Saunier, via the Faucille Pass to Heyerin, on the Geneva-Bellegarde Railway. This section would be 47 miles in length, and have 24 miles of tunnels, the three longest perforations being respectively 9.4 miles, 6.6 miles, and 4 miles long. Secondly, the Mont Blanc Railway which would use the existing line from Geneva (Eaux Vives) to Chamonix, via Le Fayet and Annemasse, to connect with a new line from Chamonix to Aosta, in the valley of the Po. The approximate distance to be traversed between Chamonix and Aosta, via the alley of the Arve, Les Honces, al Véni and Pré St. Didier, is 46 miles, and there would be two tunnels, respectively 8 miles and 3 miles in length. The estimated cost of the whole amounts to $55,000,000.

The Swiss eastern cantons, fired by the success of the Simplon, are determined to obtain better communication with the south by means of either a Splugen or Greina tunnel, for each of which a number of rival traces has been prepared. Colonel Locher, who built the Mount Pilatus railway, is backing the Splugen scheme, and his opinion carries great weight with both the Swiss and Italian authorities. The Splugen railway would extend from Coire to Chiavenna, a distance of 54 miles, of which 31 miles would be on Swiss territory, whole the Splugen tunnel itself would be 17 miles in length, the frontier line between Switzerland and Italy being crossed just half way. The estimated cost of the scheme is $25,000,000, and it could be carried out within five years.

Lastly, the construction of a direct railway between Genoa and Milan, some 70 miles in length, and burrowing under the Apennines between Rigoroso and Secca, has long been talked about. The plans have received official approval, and it is now merely a question whether the government or a syndicate shall carry them into effect. The Rigoroso tunnel would be 12¼ miles long, and the present idea is to have a perforation large enough to take two lines of way.

Personals

Mr. J. V. Nimmo has resigned from the positions of chief engineer of the New Canadian Co., Ltd., and resident engineer of the Atlantic, Quebec & Western Railway, which positions he held jointly.

Mr. V. I. Smart, signal engineer of the Chicago & Eastern Illinois, has been appointed assistant professor of transportation at McGill University, Montreal, Canada.

Mr. Lee Holliday has been appointed signal engineer and agent of the Union Switch & Signal Company and will have charge of the southwestern district, with headquarters at St. Louis, Mo., in place of F. G. Ashton, resigned.

Mr. J. S. Spelman has been appointed roadmaster of the Western Pacific at Wendover, Utah.

Mr. W. E. Stevenson has been appointed assistant engineer of the Texas Midland at Terrell, Tex.

The headquarters of Mr. S. W. Lee, consulting engineer of the Missouri & North Arkansas, have been removed from St. Louis, Mo., to Eureka Springs, Ark.

Mr. J. E. Cameron has resigned as superintendent of motive power of the Atlanta Birmingham & Atlantic to devote his entire time to the construction work, with the title of superintendent of construction, with headquarters at Talladega, Ala.

T. P. Shonts, president Toledo St. Louis & Western, announces that, effective on October 18, Mr. W. D. Taylor is appointed chief engineer of this road, with office at 927 Railway Exchange building, Chicago. Mr. Taylor is also chief engineer of the Chicago & Alton, the two roads now being controlled by the same interests. Mr. Taylor came to the Chicago & Alton on February 1, 1906, having previously, from 1901, occupied the chair of civil engineering in the University of Wisconsin, and for three years having also acted as engineering expert of the Wisconsin tax commission. From 1891 to 1898 he filled the chair

of civil engineering in the University of Louisiana, and has had extended engineering service with railways.

Mr. Edmund F. Van Hoesen has been appointed chief engineer of the Tonopah & Goldfield.

Mr. W. J. Young, chief engineer of the Lehigh & New England, has resigned to go into business at Martin's Creek, Pa.

Mr. E. M. Peden has been appointed superintendent of motive power and rolling stock of the Santa Fe Central, with office at Estancia, N. M.

Mr. W. L. Browne has been appointed acting resident engineer of the Atlantic Quebec & Western and also acting chief engineer, succeeding Mr. J. V. Nimms, resigned.

Mr. W. H. Atkins, roadmaster for the St. Louis & San Francisco lines under construction in Texas, has resigned to accept the position of roadmaster for the Panama Railroad.

Mr. J. M. Floesch, chief engineer of the Buffalo Rochester & Pittsburg, has resigned to become associated with a construction firm on the Grand Trunk Pacific. Mr. Floesch has been connected with the Buffalo Rochester & Pittsburg and its predecessors and allied interests since 1881, commencing as a transit man on the old Rochester & Pittsburg. He was chief engineer of several subordinate companies, and since January, 1900, has been chief engineer on the B. R. & P.

Mr. R. S. Davis has been appointed terminal engineer of the Mexican Central at El Paso, Tex.

Mr. E. E. Stone, assistant chief engineer of the Boston & Albany, has been appointed engineer of maintenance of way and construction, with headquarters at Springfield, Mass.

Mr. J. E. Tobin, roadmaster of the Missouri, Kansas & Texas at San Marcos, Tex., has been transferred to Smithville, Tex., in a similar capacity, succeeding Mr. W. F. Sparks.

Mr. A. Boylan has been appointed roadmaster of the Wabash at Columbia, O., in place of Mr. J. Murray, resigned. Mr. William O'Brien has been appointed roadmaster at Rook, Pa., to succeed Mr. Boylan.

Mr. M. S. Blaiklock, heretofore superintendent of the eastern division of the Grand Trunk, has been appointed engineer of maintenance of way of the entire system, with headquarters at Montreal, Quebec.

Mr. E. T. Bond has been appointed chief engineer of the Arkansas, Louisiana & Gulf, with headquarters at Bastrop, La., effective on October 1. He will have charge of all engineering corps and all contractors engaged in grading, bridge work, etc.; also maintenance of way on all constructed road. He will have charge of the preparation of all plans and profiles and will approve standard. Mr. W. S. Moody has been appointed tie superintendent, with office at Monroe, La. He will have charge of the work of providing crossties and switch ties as may be required, and will purchase tie timber and arrange contracts for the manufacture of ties.

Mr. Murray B. Snow, superintendent of the Chicago division of the Michigan Central, with office at Chicago, has been appointed assistant general superintendent, with headquarters at Detroit, Mich., succeeding Mr. J. H. Snyder, who is transferred to Chicago as superintendent.

Mr. L. H. Van Allen, division superintendent of the New York Central & Hudson River at Buffalo, N. Y., has been promoted to general superintendent at Syracuse, N. Y. Mr. S. R. Payne, division superintendent at Rochester, N. Y., has been appointed to succeed Mr. Van Allen.

Mr. C. D. Hamilton, general superintendent of the Oklahoma Central, has resigned to take charge of construction work on the Missouri, Oklahoma & Gulf, which is building southward from Okmulgee toward Sherman, Tex.

Mr. T. W. Evans, assistant division superintendent of the New York Central & Hudson River at Jersey Shore, Pa., has been appointed superintendent of the Rochester division, with office at Rochester, N. Y., vice Mr. S. R. Payne, transferred to superintendent of the Buffalo division.

Mr. George A. Clark, until recently vice-president and general manager of the Colorado Southern, New Orleans & Pacific, has been elected vice-president and general manager of the Eunice, Lafayette & Abbeville, a projected road in Louisiana.

Mr. F. B. DeGarmo has been appointed superintendent of the northern division of the Kansas City Southern, with headquarters at Pittsburg, Kan., to succeed Mr. H. E. Whittenberger, who resigned to go with the Grand Trunk.

Mr. A. F. Church has been appointed superintendent of the Mobile, Jackson & Kansas City, with headquarters in Mobile, Ala. He succeeds Mr. J. D. Patterson, resigned, to become superintendent of the Southern Railway at Atlanta, Ga. Mr. Church was formerly with the Southern Pacific at New Orleans, La.

Mr. J. H. Brinkerhoff, assistant superintendent of the fourth division of the Denver & Rio Grande, with headquarters at Alamosa, Colo., has been appointed superintendent of the Junction line of the Denver & Rio Grande at Grand Junction, Colo. He succeeds Mr. J. Q. Matthews, who has been acting superintendent.

Mr. T. J. English, division superintendent of the Erie Railroad at Youngstown, Ohio, has been appointed assistant to the general manager, J. C. Stewart. Mr. F. J. Moser, division superintendent at Huntington, Ind., will succeed Mr. English. Mr. E. C. Allen, assistant superintendent at Galion, Ohio, has been transferred to Huntington in charge of the Chicago & Erie division.

Roadmasters and Maintenance of Way Association of America

THE twenty-fifth annual convention will be held November 12, 13 and 14 at the Sherman House, Chicago, Ill. The committee reports will be on the following subjects: Maintenance of line and surface in Winter time; methods of destroying vegetation in track, including weed burners; wrecking outfits, organization and working; cost of ballasting old track and renewing ties, and cost of relaying rail, organization and working. Papers will be presented on the following subjects: The oiling of roadbed; special construction on the Cincinnati Southern Ry., and why efficient track work is skilled labor. Typical questions for discussion at the convention are as follows: Paving of ditches; length and size of ties; drainage of the midway of double track; re-adjustment of gage of curves for wear to the side of rail head, and quality of track labor.

Maintenance of Way Master Painters Association of the United States and Canada

THE fourth annual convention of the Maintenance of Way Master Painters' Association of the United States and Canada will be held at the Great Northern Hotel, Chicago, Ill., on November 19 and 20.

In the notice of the secretary, H. J. Schnell, 100 William street, New York, it is stated that a number of important topics connected with railroad, roadway, bridge and building painting will be discussed and that a full and free exchange of views and experience on topics connected with maintenance of way painting is desired. All foremen painters connected with the maintenance of way department and engineers of maintenance of way are invited to attend.

Trade Notes

The Watson-Stillman Company, New York, have recently issued a new catalog, No. 71, on hydraulic pumps. It replaces the old catalog, No. 56, and contains a large amount of new matter.

The Union Switch & Signal Company has under construction a new foundry, forge shop and power house. These buildings will add about 40 per cent to the present floor space of the Swissvale works, but, with the very ample yard room that the company now has, as a result of its recent purchase of land, it can probably handle without embarrassment at least 60 per cent more business than it has ever done before. The machinery for the new shops has been contracted for and is being delivered.

Bulletin 4002, recently issued by S. F. Bowser & Co., Inc., is devoted to the Bowser System of oil storage as especially adapted to the needs of railway storehouses, terminals, signal towers, etc. It describes in detail the construction of the different styles of tanks, pumps and accessories manufacturing by the Bowser company and is profusely illustrated with half-tones of some of the larger railroad installations made by the company, together with several suggestions for oil storage systems. This bulletin emphasizes the safety, economy, convenience and cleanliness of the Bowser System and lays especial stress upon its flexibility, since it is adapted to both the largest and smallest requirements and can meet any local condition which might arise. Upon application to S. F. Bowser & Co., Inc., Fort Wayne, Ind., copies of this bulletin will be sent to any address.

The Lidgerwood Manufacturing Company describes in its bulletin No. 21 the Lidgerwood patent slip-drum electric hoisting winches for car ferries.

Maryland Rail Company, Cumberland, Md., is enlarging its plant. Among the improvements is the addition of a light rail mill.

American Automatic Switch Company, Salisbury, N. C., has been incorporated with a capital of $100,000, half of which has been subscribed. Incorporators: P. H. Thompson, F. M. Thompson and D. L. Avery.

American Bridge Company's iron works near Philadelphia, Pa., on October 14 were damaged by fire to the extent of $300,000, according to press reports. Twelve freight cars standing on a side-track of the Philadelphia & Reading were destroyed.

C. H. Whall & Co., Boston, Mass., manufacturers of fibers for railroad insulation, have completed a paper mill to work in connection with their fiber plant for the manufacture of special papers for use in the making of railroad insulation fibers. At the meeting of the Railway Signal Association the company exhibited a panel showing samples of track circuit insulations for insulating rail joints. F. R. Whall represented the company as usual.

Charles Hansel & Co., 43 Wall street, New York City, have been engaged by the North Platte & Encampment Canal Company to prepare the surveys, plans and estimates and to take charge of the construction of a canal for the irrigation of 93,000 acres of land extending from Saratoga, Wyo., south to the Colorado state line. This work will involve the building of a canal with a capacity of 1,000 second feet and it will carry with it the development of a hydro-electric plant of considerable magnitude.

Mr. H. M. North, engineer in charge of construction of the Lake Shore & Michigan Southern Railway, has awarded the contract for the concrete piles for the footings of the Cuyahoga viaduct of the Cleveland Shore Line road to the Raymond Concrete Pile Company, of Chicago and New York.

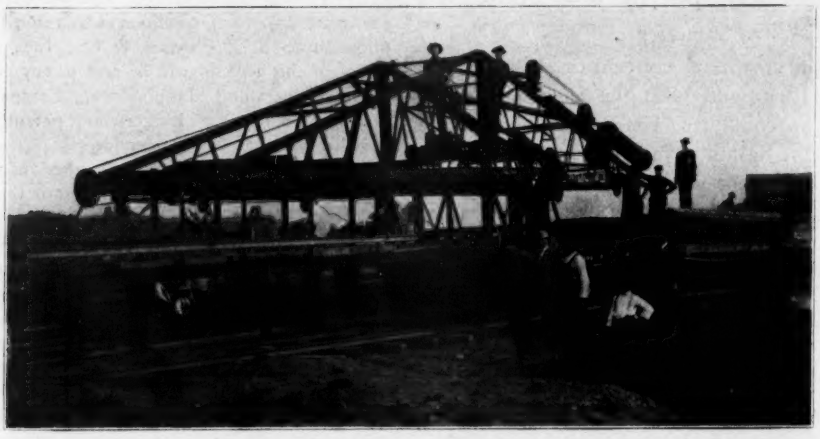
The Chicago & North-Western's plant for treating railroad ties at Escanaba, Mich., is to be enlarged at an expense of $25,000. In addition to the Wellhouse process, now in use, the Rutger creosote process is to be employed hereafter. With the Wellhouse process (chloride of zinc) only soft timbers can be treated to advantage, but with the creosote process hard woods can be treated with profit.

The Chilean government is asking bids on railroad construction on the state railroads; also for an electric light plant, etc. The estimate is about $600,000. Address Minister of Industry, Communications and Public Works, Santiago, Chile. A concession has been granted Senor Pedro A. Rosseldt, of Santiago, for railroad construction estimated at about $4,000,000. He may be addressed care of the Minister of Industry.

Kentucky Bridge Company, Lexington, Ky., has been incorporated for the purpose of building structures of iron, steel, concrete and wood. The incorporators are: Edward Stamler, John C. Kindred, Laura Van Nice and George Collins.

Emery Steel Company, Brown-Marx building, Birmingham, Ala., has been incorporated by J. A. Emery, R. C. Foster and J. H. Pritchard, with a capital stock of $15,000. The company will operate the Weller rolling mill at Gadsden, Ala. Track bolts, light rails, concrete bars and other specialties from soft steel will be manufactured.

John MacD. Greene, Drexel building, Philadelphia, as an engineer-broker, acts for buyers or sellers of second-hand railway and contractors' equipment. He has a list of avail-



WESCOTT TRACK-LAYER, SHOWING TWO RAILS SUSPENDED AND TIES IN THE CONVEYOR.

able materials on hand for those desiring an entire or any part of an equipment. The modernizing of manufacturing plants is a special feature of Mr. Greene's work.

W. F. Bossert Manufacturing Company, Utica, N. Y., has been incorporated with a capital stock of $50,000 to manufacture railway signals. The directors of the company are: William F. Bossert, 432 Sunset avenue; Hiram C. Williams, 351 Genesee street; Charles G. Bennett, 342 Blandina street, all of Utica, N. Y.

The Cuba Railroad recently bought a No. 4 "K" Gates crushing plant built by the Allis-Chalmers Company, Milwaukee, Wis., for use at Camaguey, Cuba. This machine will be mounted on masonry foundation and fitted with smooth head and concaves; it is to be used to crush limestone to 2½ in. size.

Wescott Track-Layer

The track-layer picks up the rails, conveys them forward and places them on the ties ready for spiking. It will be seen by the illustration that the rails are laid in front of the car, while two are suspended, ready to be dropped the moment the train is pushed ahead. In operation the rails are run out as the train is being pushed forward.

The ties are shown in the conveyor, which is started as soon as the train comes to a standstill. The ties are distributed while the rails are being spiked.

In regard to the operation of the machine, a contractor made the following statement:

"Under favorable conditions, 2 to 2½ miles per day can be laid with the following force of men: Four men to operate machine and feed ties and rails; one foreman; four strappers; eight spikers; four nippers; six tiemen to distribute and space, and one peddler."

The machine is manufactured by the Wescott Track-layer & Manufacturing Company, Puyallup, Wash.

Railroad Safety Rod

The device, here illustrated, is a railroad safety rod which is used to prevent the rails from spreading. It may be utilized independently of the ties.

The tie-bar is straight and made of greater length than the distance between the outer sides of the rails which it is intended to tie or couple together. Each end of the tie-bar is provided with an enlarged head, which consists of a vertical projection or shoulder and a supporting brace. A screw is arranged transversely in each shoulder and their inner ends bear against braces or blocks which are placed between the shoulders and the sides of the adjacent rails. These blocks are made of hard wood and provided with a groove, adapted to receive the adjacent face of the shoulder, while their opposite sides conform to the shape of the web or body of the rail and its base-flange.

A metal plate is placed in the groove and serves as a bearing for the point of the screw in the head. In case the track is to be made of other gauge, the bolts, which tighten the lips that clasp the inside base-flange, are slackened and the metal plate is replaced by one of greater thickness, according to gauge required. Wooden blocks have been extensively used as parts of clamping mechanism for holding railroad rails; but they have ordinarily been secured by friction alone. It is obvious that in this case they are held both from endwise and vertical movement, so that accidental dislodgement is impossible. The blocks also act on the

RAILROAD SAFETY-ROD.

rolling stock the same as the wooden ties act upon the rail, taking off the vibration and making a more quiet run.

When the safety rod is once adjusted, there will be no necessity of again gauging the track. By its use the sleepers or ties supporting the rails are relieved of strain and wear, which will render them serviceable for a much longer period.

The device has been patented by Benjamin Sargent, Rock Island, Ill.

Technical Publications

EXPLANATION OF SWITCH AND SIGNAL CIRCUITS, by John T. Doran. Published by Doran & Kasner, 71 Nassau street, New York. Cloth binding, 5x6½ ins., 140 pages.

This book is published for the man in the signal business. The descriptions are illustrated with diagrams of circuits and views of the apparatus. The maintainer of signaling appliances will find the volume of value, because it will give him a broader knowledge of this branch of railroad engineering.

THE USE OF THE NATIONAL FORESTS, by the U. S. Department of Agriculture, Forest Service, Gifford Pinchot, Forester. Cardboard binding, 42 pages, 5x7 ins., illustrated.

It is stated that the object of the publication is to inform the people what the National Forests mean, what they are for and how they are used.